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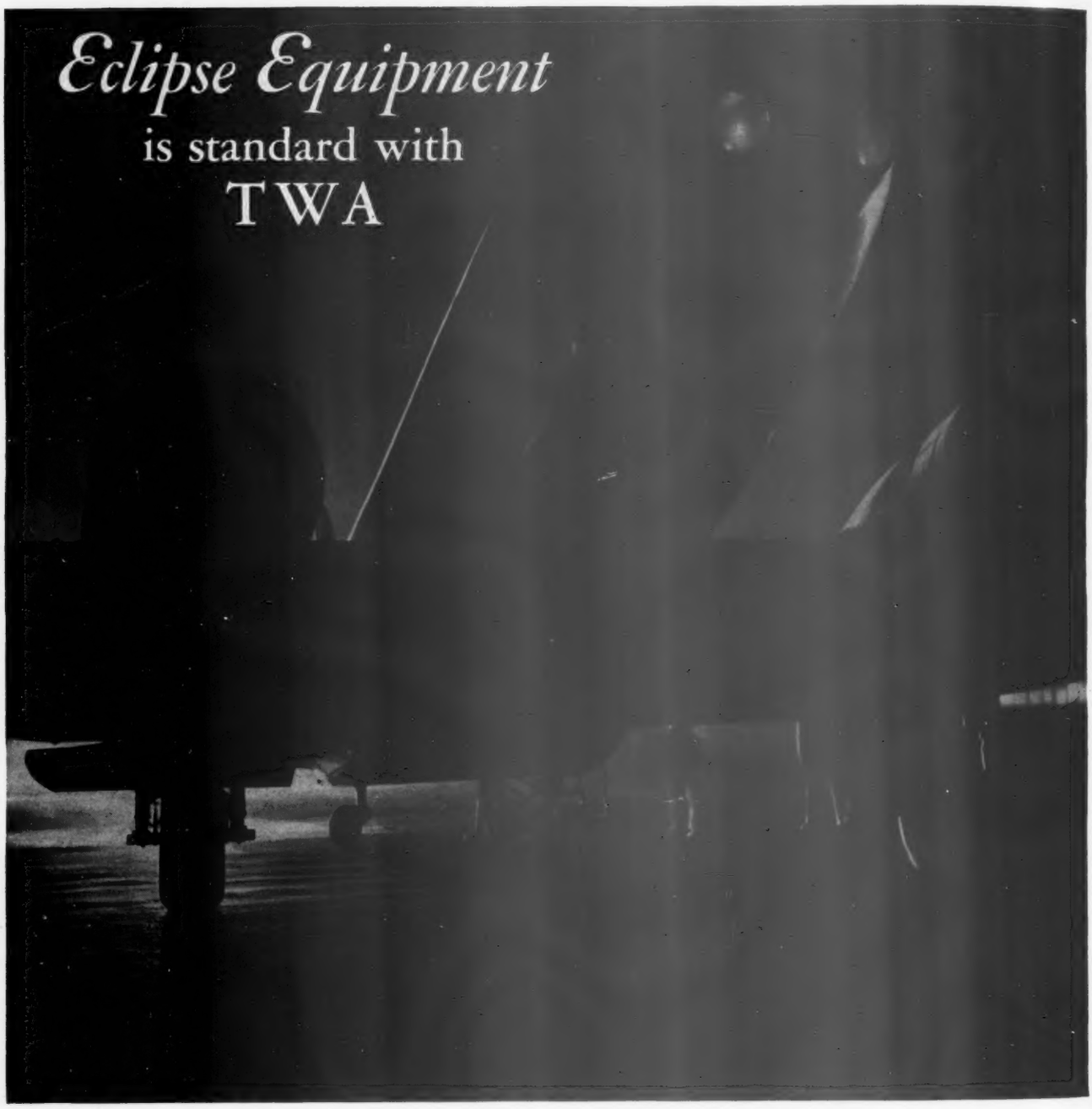

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Published monthly, price 35c. a copy. Subscription rates—United States, Mexico and Central and South American countries, $3.00 a year. Canada including duty, $3.50 a year. All other countries, $4.00 a year or 24 shillings. Entered as second-class matter July 27, 1918, at post office at New York, N. Y., under the act of March 3rd, 1879. Printed in U. S. A. Cable address "McGrawhill, New York." Member of A.B.C. Copyright 1934, by McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York, N. Y.

AVIATION

Established 1916 . . . McGraw-Hill Publishing Company, Inc.

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

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ON LEAVE OF ABSENCE

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McGraw-Hill Publishing Company, Inc., 330 W. 42d St., New York, N. Y.

Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.
James H. McGraw, Chairman of the Board; Malcolm Muir, President; James H. McGraw, Jr., Vice-President and Treasurer; L. F. Stoll, Vice-President; B. R. Putnam, Secretary

Printed by The Schweinler Press, N. Y.

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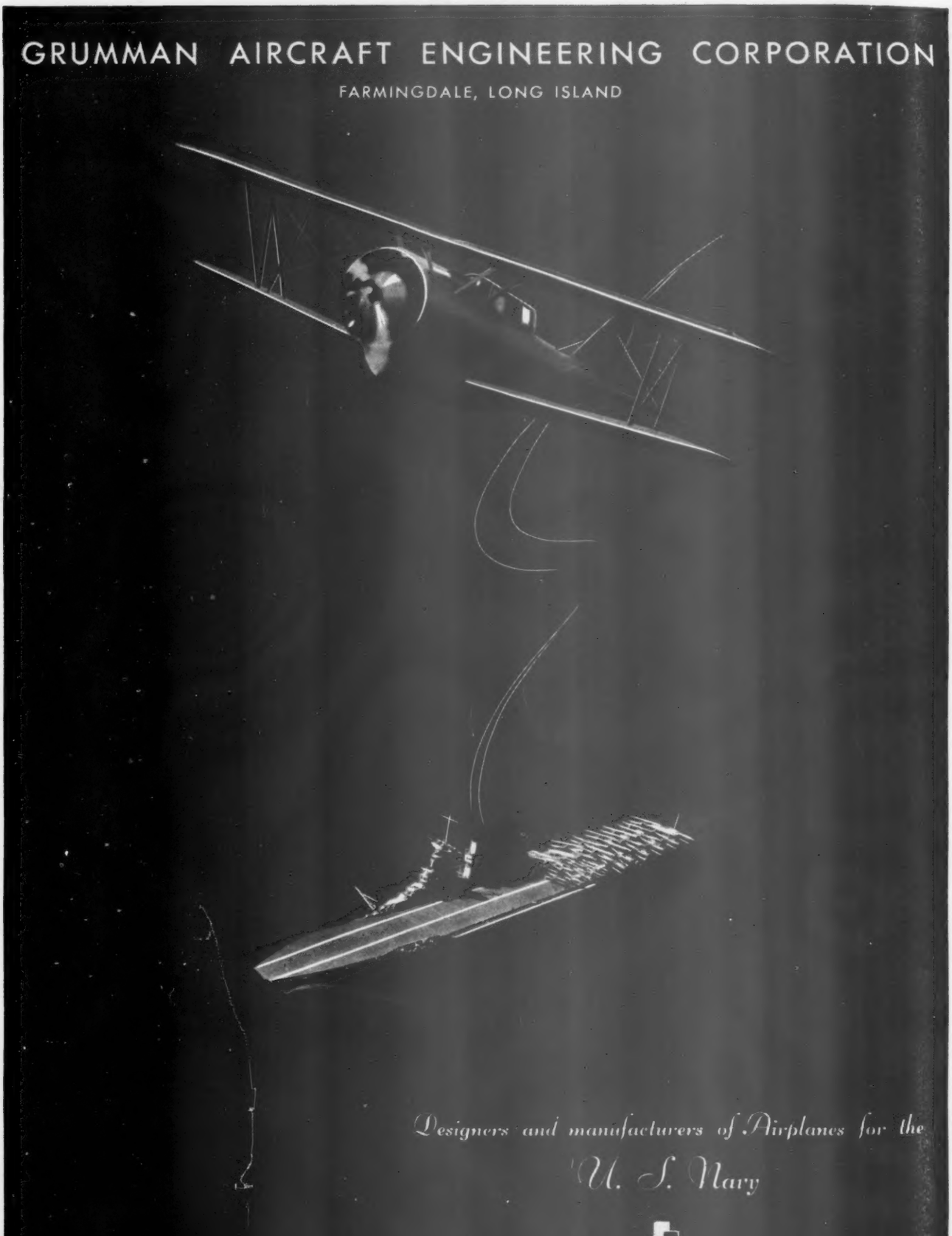
FARMINGDALE, LONG ISLAND



Designers and manufacturers of Airplanes for the

U. S. Navy

AVIATION
FOR OCTOBER, 1934

National Air Races 1934

Attendance reached a new high for four-day meets and approached the records of 1928 and 1929. Thousands were turned away.

RACE HABITUES who foregathered at Cleveland in an atmosphere of skepticism amounting almost to pessimism were due for a shock. The surprise came not from design novelties unveiled at the barrier, nor from startling performances put up by last year's revamped racers, but from the crowds—crowds that choked all roads leading to the field (25,000 cars were counted by Cleveland's Automobile Club on Labor Day) —crowds that elbowed through turnstiles to fill the huge stands to capacity (close to 60,000 was the reported peak). They came not only from Cleveland—urged on by posters, window displays, convenient downtown ticket booths, special street decorations—but from elsewhere in Ohio—from many neighboring states. Over 40 per cent of cars counted came from outside Cuyahoga County. On Labor Day over 4,000 foreign licenses were recorded.

Great credit is due to the officials—police and National Guard — who handled the traffic. Cars pouring six and eight abreast through entrance gates were shunted efficiently into well-dressed ranks in huge parking areas. Only one serious jam marked the whole four days, and that was quickly disentangled. Thanks to the Automobile Club best routes through the city had been studied in advance, and plainly marked for the benefit of the out-of-town visitors.

Besides the thousands who paid their money at the gates to park their cars, sit in grandstands, other thousands looked on from outside. In spite of canvas curtains stretched over fences, many points of vantage were available. Astute owners of adjacent properties were not slow in advertising parking space ("Park Here—See Over—25 cents"), renting chairs on porches, space

on housetops. One enterprising proprietor of a flat roof did his own announcing of events through a megaphone. Urchins perched on bill-boards —and many an adult found it not beneath his dignity to scale convenient trees or to squat on car tops. From the press stands one could see these casual onlookers in open spaces as far as the eye could reach.

Surprise?—Yes—and a pleasant one for race backers. For the first time in years the National Air Races netted a profit, estimated at this writing to be in the neighborhood of $45,000. Good weather, advance ticket sales, lower ticket prices, good publicity were undoubtedly contributing factors. Apparently air races can still be made to pay.

The program

A strictly enforced system of fines worked wonders in keeping the program of events on schedule. After the management had cracked down on several delinquents on the opening day, the news spread like wildfire among the contestants and from that time on there were no further interruptions during the entire meet. The noticeable reduction of lag between events was a welcome improvement. The continuity was far better this year than it has ever been at any previous National Air Race; it is not unreasonable to expect that, with judicious selection and careful control, some degree of overlap could be introduced and some closer approach be made to the interest-holding qualities of the two- or three-ring circus.

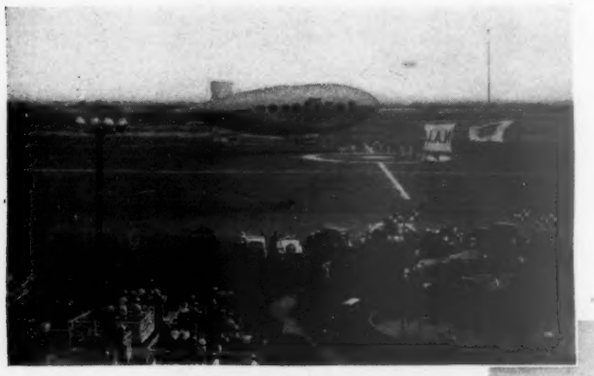
By the use of a quadrangular course around the grandstand which faced the home stretch with pylons at either end of the field, it was possible to keep the airport open to commercial traffic at all times and the extensive scheduled transport operation in and out of Cleveland was not interrupted. The pylons were arranged for courses of 5, 8½ and 10 miles, and the Thompson Trophy Race was originally scheduled to use the 5-mile course. Strenuous objection on the port of some of the contesting pilots resulted in a compromise and the 8½-mile course was used. Operations in the timing stand were facilitated by the availability of experienced personnel in a familiar setting. Most of the key men from last year were available and the arrangements in the Cleveland Stadium are convenient and well known to those who have been concerned with timing activities at previous contests.

As usual the program depended heavily on exhibition flights, parachute jumps, and the cooperation of the Army, Navy, and Marines. Although these features were much the same as they have been in previous race meets, several of them were particularly impressive. The one wheel landing of Milo Burcham showed originality but would have been just as effective if the audience had not been led by the radio announcer to believe that it was accidental. In fact, a series of emergency landings of various types with frank explanations over the public address system, might do much to combat the still popular impression that any sort of mechanical failure in the air inevitably results in disaster.

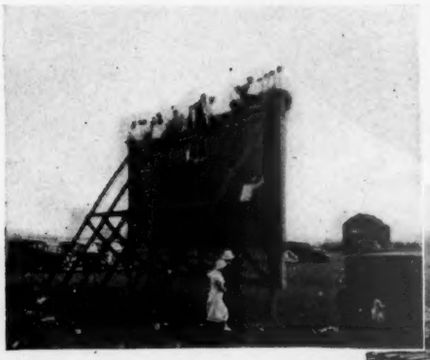
The formation acrobatics of the three Army pilots known as the "Men on the Flying Trapeze" was also noteworthy for its precision. The evening show was enhanced by the operations of the Navy planes with wing-tip flares and the audience reacted very favorably to this spectacular demonstration. A source of never-ending amusement was the nightly race and other performances of the early model automobiles that had been collected for the occasion.

The racers

Airplane designers seeking new ideas for increased performance were keenly disappointed, as almost all of the ships in evidence had been seen at previous meets and came to Cleveland for the most part without modification. Misfortune seemed to have followed several of the new planes designed particularly for the races. The Granville, Miller & DeLackner ship flown by Lee Gehlbach in the Bendix Transcontinental Race, which had been entered without benefit

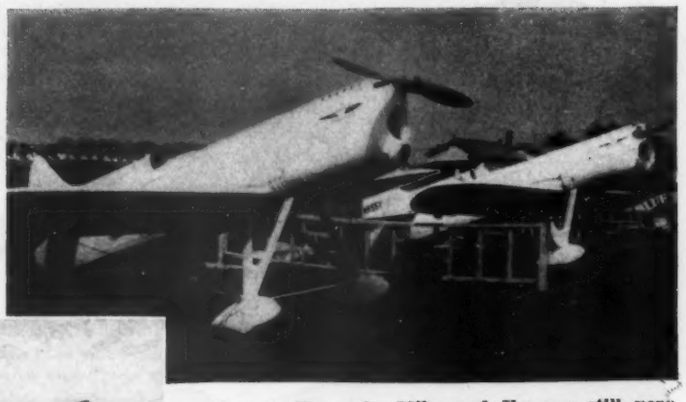


The arrival of the blimps. Monday's program included christening ceremonies for the dirigible "Enterprise" which was flown over from Akron.



Right: A small section of the parking space inside the grounds which accomodated a total of 25,000 cars on Labor Day. Above: Several ways of seeing the races. It is a difficult problem to fence off airports when the neighboring citizens are as ingenious as these random glimpses indicate.

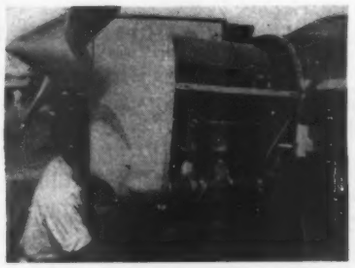
The Hornet-powered Wedell-Williams 57 flown by Roscoe Turner, winner of the Thompson Trophy Race.



Ben O. Howard's Mike and Ike are still very much alike and have undergone little modifications since last year's races.

Above: The familiar Keith-Ryder (Menasco) made a good showing in the 500-cu.in. group. Right: The famous Wedell-Williams 44 winner of the Bendix Transcontinental Speed Dash. Below: Lee Miles in his Miles and Atwood Special took first prize in several of the 375-cu.in. group events.

Second place in the Thompson Trophy Race was taken by Roy Minor flying the Menasco powered Brown Special.



Compact engine installation in the Chester Special flown by Art Chester and manufactured by the Airplane Sales Corporation, Glenview, Ill.

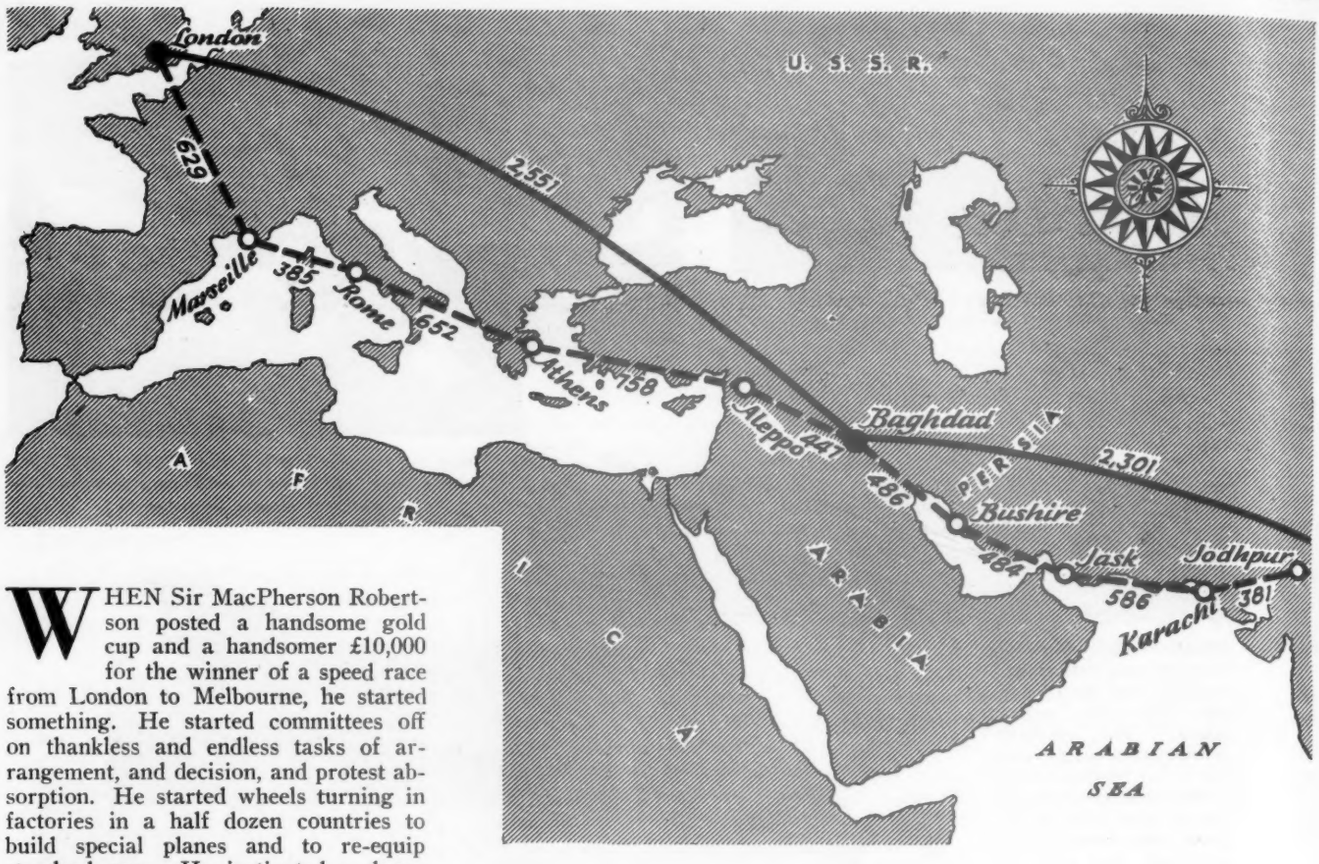
of sufficient test flying, and is listed among the entrants in the McRobertson race, was forced to withdraw before reaching Cleveland, but arrived at the airport after the expiration of the specified time limit for the Bendix race. An airplane representing the most advanced stage of Ben O. Howard's design philosophy had been damaged in trial flights and could not be repaired in time to get to Cleveland.

The time-worn practice of clipping wing area was very much in evidence, the chief example being S. J. Wittman's Chief Oshkosh, in which the area had been successively reduced from 78 sq.ft. to 42 sq.ft. Control surface areas also had been reduced in many cases and several of the smaller airplanes were perceptibly unstable longitudinally as a result of the close coupling and reduced stabilizer area. The "Chester Special" built for Art Chester by the Airplane Sales Corporation, of Glenview, Ill., and the Brown Special built for Roy Minor, by the Lawrence W. Brown Aircraft Company of Los Angeles, both Menasco-powered, were notable for excellence of finish.

The races

The lack of technical progress was reflected in the infinitesimal advances in speed, none of which were sufficiently great to constitute new world records. The highest speed of the meet, made by Doug Davis in the unlimited displacement qualification dashes, just a short time before his fatal injury in the Thompson Trophy Race, was 306.215 m.p.h., only slightly more than 1 m.p.h. greater than the top speed made at last year's races by the late James R. Wedell in the same airplane—the Wedell-Williams 44, Wasp-powered monoplane. Davis, in the same ship, had won the Bendix Transcontinental Speed Dash on the opening day of the race.

Lee Miles, who had won honors at previous meets this year in his Menasco-powered Miles and Atwood Special, was a consistent winner in the 375 cu.in. displacement group, his highest speed attained in the Shell speed dash for this classification being 233.44 m.p.h. The Brown Special owned by Roy T. Minor, who forced it into second place in the Thompson Trophy Race, reached 243.145 m.p.h. in the Shell qualification dashes of the 550 cu.in. displacement group. In the 200 cu.in. class, S. J. Wittman is a Pobjoy powered plane with very little wing area, took first honors with a speed of 113.498 m.p.h. The Menasco-powered Howard "Mike" was pushed to 239.623 m.p.h. by Harold Neuman in the 550 cu.in. Shell qualification tests. Tabulated results of the racing events will be found on page 328.



Off to "Down Under"

A pre-race summary of the MacRobertson free-for-all

WHEN Sir MacPherson Robertson posted a handsome gold cup and a handsomer £10,000 for the winner of a speed race from London to Melbourne, he started something. He started committees off on thankless and endless tasks of arrangement, and decision, and protest absorption. He started wheels turning in factories in a half dozen countries to build special planes and to re-equip standard ones. He instigated a dozen personal surveys of the route by prospective contestants. He remade the summer for the foreign departments of several American shipping companies, and caused more campaigns for the raising of funds for aeronautical enterprises than we have seen since 1929. He focused world wide attention on the growing rivalry between American and non-American schools of airplane construction. He started something in short that may go down in history as the greatest long distance race in the history of aeronautics, or the last one, depending largely on the vagaries of the weather and contestant discretion.

A detailed history of the rules, regulations and route stipulations; a description of the 64 entries and their crews; a complete analysis of the topography and climate to be encountered; a development of all the issues involved would together fill a fat volume. AVIATION offers the following fragmentary summary as a more generally useful document, with the promise of further treatment at race time.

Rules, regulations and prizes

There are to be two concurrent races, a Speed Race, and a Handicap Race. The start of both will take place at dawn on Oct. 20 from the new R.A.F. field at Mildenhall, 55 miles northeast of London. Thereafter the contestants in the Speed Race must land at "control points" at Baghdad, Allahabad, Singapore, Darwin, and Charleville. The finish line will be laid out on the race track at Flemington near Melbourne, the final landing to take place at Point Cook close by. The rules of this race specifically stipulate that the first plane across the finish line shall be the winner. First prize £10,000 and Gold cup; Second Prize £1,500; Third £500.

The Handicap Race rules also require landings at the "control points" but allows time to be taken out at such points and at various "checking points" at approximately 500-mile intervals along the route. The winner will be the contestant with the lowest actual flying time less handicap allowance time, to be computed as the length of the course divided by

$$140\left(1-\frac{0.2\ \text{Payload}}{\text{All Up Wt.—Payload}}\right)\left(\frac{\text{Hp.}}{\text{Area}}\right)^{\frac{2}{3}}$$

The Handicap Race contestants must cross the finish within nineteen days of the start in London. First Prize will be £2,000; Second £1,000. The pilot of any aircraft entered in either race which completes the course within the nineteen days will receive a gold medal.

There are also numerous and generally reasonable stipulations of details of protest procedure, of minimum equipment, of allowable load, etc. An early misunderstanding arising from the differences between American and European Airworthiness requirements seems to have been ironed out by allowing American R entries until Oct. 13 to qualify for the I.C.A.N. certificate. Planes in both race categories will be carefully limited to the loads specified in their certificates on each take-off.

All the world's weather

The take-off at Mildenhall has been timed at dawn in order to give the contestants a chance to get out of Europe in daylight. October in Europe north of the Mediterannean is apt to be overcast and rainy, with attendant ice-formation and visibility difficulties. Once across the Alps on the Great Circle course, or to Marseilles, the first Handicap "check-

ing point," the weather should be generally clear to the beginning of the Syrian desert. From there to the end of the Persian Gulf sandstorms may occur. The British, Dutch and French airlines operating through this region have reported such storms reaching up to heights of 20,000 ft. Contrary to common opinion they have little if any effect upon the plane or engine but are serious obstacles to navigation.

The flight across India to Calcutta should present few difficulties. The famous monsoon rains are definitely finished along this part of the route by the beginning of October. From Rangoon to Singapore rains and high winds may still be expected and the country is extremely unfavorable in many parts. Soft fields are practical certainties. Here, if anywhere, heavily loaded planes with comparatively small wheels may expect difficulties. From Singapore to Darwin, although there are marked differences in various regions, cumulus cloud formations, rough air, and sudden squalls are regular daily phenomena. There are however numerous and good airports scattered through the whole Dutch East Indies. Australia itself has a formidably desert midland, and it was largely to prevent possible loss of life in case of forced landing in this area that a control point was put in at Charleville.

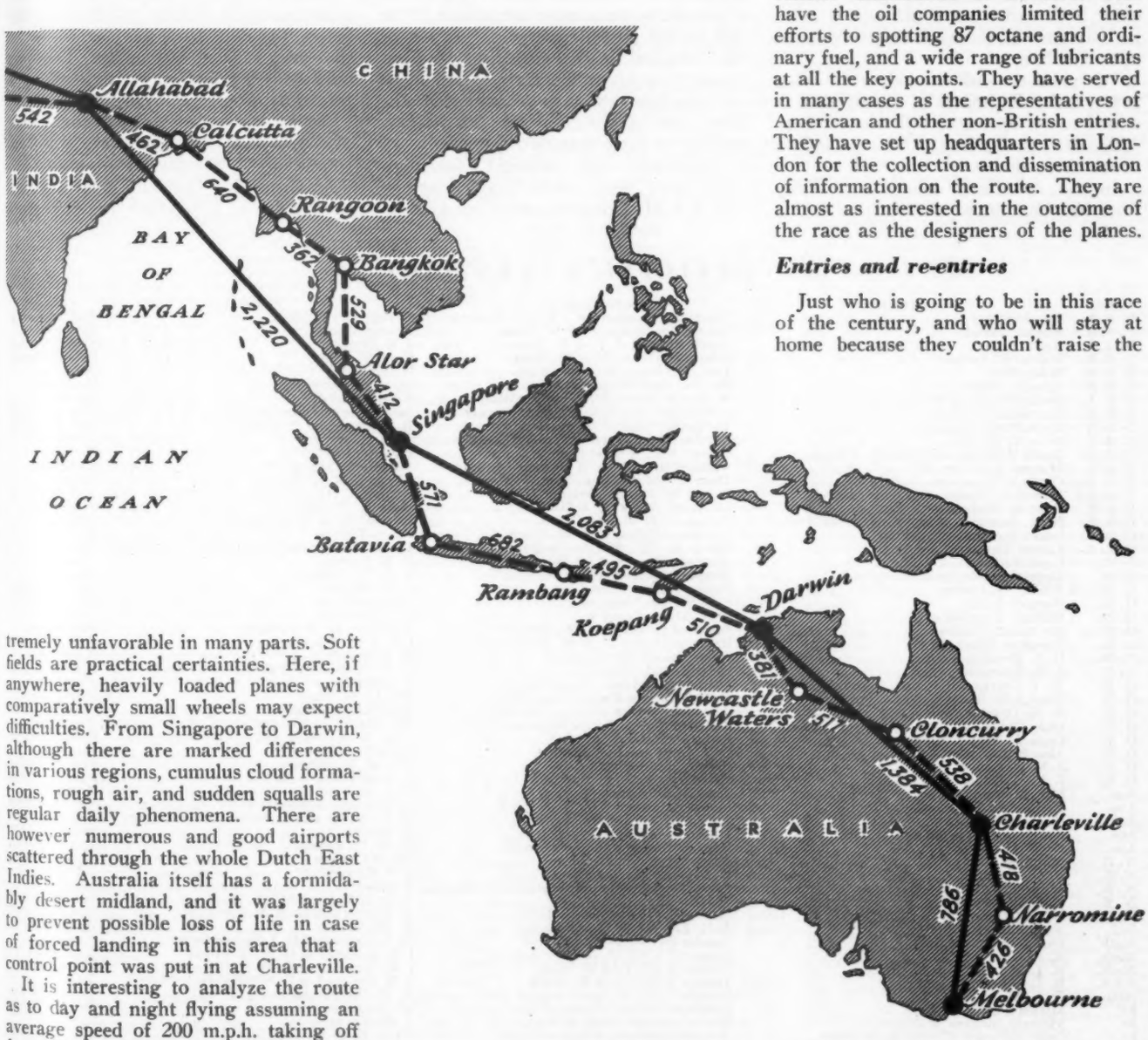
It is interesting to analyze the route as to day and night flying assuming an average speed of 200 m.p.h. taking off from England at 6 a.m. and flying a 12,000-mile route. (The great circle route between all control points is only 11,325 but is forbidden over parts of the Balkans, Persia, Afghanistan, and Northern India, and is very hazardous from Alahabad to Darwin). Allowing for a ten hour difference in time our hypothetical plane would arrive in Melbourne at 5 a.m., local time, Oct. 23, having spent three nights in the air; the first crossing Syria and Persia; the second on the difficult stretch between Calcutta and Batavia, the last in traversing Australia.

The fields at the control points are all equipped for night landings, or will be by race time. Few parts of the route are marked with beacons in the American sense but the many coastlines along the way (on the conservative route) are equipped with lighthouses for surface vessels, and seacoasts, rivers, mountains, desert tracks and other landmarks are abundant. In Australia the Race Committee has assembled an astounding array of flares, searchlights, oil pots and miscellaneous fireworks to speed the weary racer.

The airports themselves are by no means up to the standards set forth in our Bureau of Air Commerce regulations for A1A rating, but those as far as Batavia have been proven adequate for international airline purposes. Several of those in Australia which looked least attractive in the preliminary sketches have been substantially improved during the past summer. On all of them the facilities for refueling have been tremendously increased, and extensive supplies of aviation fuel have been spread over the route by both the Shell system and the European and Asiatic distributors of Stanavo. Nor have the oil companies limited their efforts to spotting 87 octane and ordinary fuel, and a wide range of lubricants at all the key points. They have served in many cases as the representatives of American and other non-British entries. They have set up headquarters in London for the collection and dissemination of information on the route. They are almost as interested in the outcome of the race as the designers of the planes.

Entries and re-entries

Just who is going to be in this race of the century, and who will stay at home because they couldn't raise the



LONDON TO MELBOURNE

The solid circles indicate "control" points where all contestants must stop. The solid lines are the great circle courses. Open circles are "checking" points where handicap contestants may rest at their own option.

funds, and whose planes will be unfinished or still full of bugs at race time is frankly beyond the clairvoyant powers of this publication. The official entry list contains 64 nominators with their planes and crews. It includes 18 American entries; 17 British (including under protest Colonel Fitzmaurice who wanted an Irish rating); 12 from Australia and New Zealand; 7 French; 4 Dutch; 2 Italian; 1 German; 1 Portuguese; 1 Swedish; and 1 Danish.

The aircraft listed included 24 American planes and 27 planes equipped with American engines.

Nine craft have been entered in the Speed Race alone, 27 in the Handicap, and 28 straddled, (a part of the official regulations states that a plane might enter both races but could win a prize in only one of them, decision required upon finishing).

We print the full list below for what it is worth. Estimates of the number of actual contestants that will take off from Mildenhall varies from 50 downwards to about three dozen.

In the American delegation; Wiley Post has announced definitely that his plane will not be ready. Clyde Pangborn will enter no plane of his own but will accompany Roscoe Turner who is certainly going. Ruth Nichols has likewise decided against racing in her own ship.

Jacqueline Cochran is very definitely in. Rumor has it that she may have taken over a second entry. Certainly her crew members and representatives have been abroad for some time making special preparations.

Colonel Hutchinson of the New York, London, Moscow venture has announced that he will fly to Europe some weeks prior to the race start.

Almost everyone else seems to be neither certain to go nor definitely out. Harold Gatty, Walter Varney, Laura Ingalls, the Thadens, Jack Wright and a few of the remainder are known to be still in the possible category. If ten of the original eighteen American entrants turn up at the start, it would be an excellent showing considering the high cost of the venture. There may well be no more than two or three.

American craft entered by non-Americans seem more likely starters. The K.L.M. Douglas was shipped weeks ago. The A.B. Aerotransport's Northrop Delta is already in Europe. Kingsford-Smith has received his Lockheed Altair and two other Australians are also American equipped. Colonel Fitzmaurice is soon to take delivery on his special Bellanca.

The majority of the French entries are reported to be having difficulties completing their craft in time for ample testing. The K.L.M. will probably have but two of its entries actually at the start, one of them, we hope, the Douglas. The British are enthusiastic about the previews they have had of the D.H. Comet still under test for three entries. From Italy and Germany comes no definite news at all.

And so it goes. There is a great deal of aeronautical history still to be written before the flag drops for the winner of the speed race in Milbourne. The quotable odds against any single entry at this time would be tremendous.

As for the handicap race, such things are uncertain enough over a 10-mile course on a Sunday afternoon at the Fair Grounds. This one looks about as predictable as a nineteen day dice game.

OFFICIAL ENTRY LIST

Nation	Nominator	Plane and Engine	Pilots	Races
U. S. A.	Harold Gatty	Douglas Transport DC, Wright Cyclone	J. Frye and H. Hull	Spd. & Hndcp.
U. S. A.	Roscoe Turner	Boeing Transport, P. & W. Wasp	Roscoe Turner	Speed
U. S. A.	Keith Rider	Keith Rider R-3, P. & W. Wasp, Jr.	J. E. Granger	Spd. & Hndcp.
U. S. A.	Walter T. Varney	Lockheed Orion, P. & W. Wasp	Capt. F. Rose	Spd. & Hndcp.
U. S. A.	Wiley Post	Lockheed Vega, P. & W. Wasp	Wiley Post	Speed
U. S. A.	Salvador Farre	Percival Gull, Napier Javelin	Salvador Farre	Handicap
U. S. A.	Wedell-Williams Air Service Corp.	Wedell-Williams 303, P. & W. Wasp	No pilot listed	Speed
U. S. A.	Jacqueline Cochran	2 P.L.C.M. Northrop, Wright Conqueror	Jacqueline Cochran and Wesley Smith	Spd. & Hndcp.
U. S. A.	Lyon Flight Expedition Co., Inc.	Lockheed Orion, P. & W. Wasp	R. F. Lape and H. Lyon	Spd. & Hndcp.
U. S. A.	John H. Wright	Lambert-Monocoupe, Warner Super-Scarab	John H. Wright	Handicap
U. S. A.	Davis Wehman and Paul W. Clough	Cessna AW, Warner Scarab	Paul W. Clough	Handicap
U. S. A.	Murray B. Dilley, Jr.	Vance Viking, P. & W. Wasp	Murray B. Dilley, Jr.	Handicap
U. S. A.	Clyde E. Pangborn	Granville Monoplane, P. & W. Hornet	Clyde E. Pangborn	Speed
U. S. A.	Russell A. Hosler	Hosler B., Curtiss Wright D12	Russell A. Hosler	Spd. & Hndcp.
U. S. A	Ruth R. Nichols	Lockheed Altair, P. & W. Wasp	Ruth R. Nichols	Handicap
U. S. A.	N. Y., London, Moscow, Air Lines, Inc.	Vultee 5-1A, Wright Cyclone	Lt.-Col. G. R. Hutchinson	Speed
U. S. A.	Laura Ingalls	Lockheed Orion, P. & W. Wasp	Laura Ingalls	Speed
U. S. A.	Louise Thaden	Beech A. 17F., Wright Cyclone	Louise Thaden and Maj. Herbert V. Thaden	Speed
G. B.	Lord Nuffield	Airspeed Envoy, A.S.6 Wolseley A.R.9	G. E. Lowdell	Handicap
G. B.	Aircraft Exchange & Mart, Ltd.	Airspeed Courier A.S.5, Cheetah V	A. L. T. Naish	Handicap
G. B.	F/O C. G. Davies	Fairey IIIF, Napier Lion	C. G. Davies	Spd. & Hndcp.
G. B.	Bernard Rubin	D.H. Comet, Gipsy Six	Bernard Rubin	Spd. & Hndcp.
G. B.	William Courtenay	D.H. Moth, Gipsy I	W. Courtenay	Handicap
G. B.	Sir Alan J. Cobham	Airspeed Courier A.S.5A, Cheetah V	Sqd.-Ldr. D. E. Stodart	Handicap
G. B.	Hospitals Trust, Ltd	Bellanca Mono., P. & W. Twin Wasp, Jr.	Col. J. C. Fitzmaurice	Spd. & Hndcp.
G. B.	H. L. Brook	Miles Falcon, Gipsy Major	H. L. Brook	Handicap
G. B.	A. O. Edwards	D.H. Comet, Gipsy Six	C. W. A. Scott and T. Campbell Black	Spd. & Hndcp.
G. B.	W. J. Cearns	D.H. Moth Major, Gipsy Major	S. Jackson	Handicap
G. B.	Flt.-Lt. G. Shaw	British Klemm Eagle, Gipsy Major	Flt.-Lt. G. Shaw	Handicap
G. B.	R. K. Dundas, Ltd.	Airspeed Courier A.S.5A, Cheetah V	Mrs. Keith Miller	Handicap
G. B.	Lady Cobham	Airspeed Envoy A.S.6, Wolseley A.R.9	Flt.-Lts. H. C. Johnson and G. A. V. Tyson	Handicap
G. B.	Capt. T. Neville Stack	Airspeed A.S.8, Cheetah VI	Capt. T. N. Stack and S. L. Turner	Spd. & Hndcp.
G. B.	Alan S. Butler	D.H. Dragon, Gipsy Major	Pilot Not Named	Handicap
G. B.	J. K. C. Baines	Fairey Fox, Felix Curtiss	F/O H. D. Gilman	Spd. & Hndcp.
G. B.	J. A. Mollison	D.H. Comet, Gipsy Six	J. A. and Mrs. Mollison	Spd. & Hndcp.
Aus.	Mrs. Melrose	D.H. Moth, Gipsy	C. J. Melrose	Handicap
Aus.	Sir Charles Kingsford-Smith	Lockheed Altair, P. & W. S.I.D.I.	Sir C. Kingsford-Smith and P. G. Taylor	Spd. & Hndcp.
Aus.	H. C. Miller	Lockheed Vega, P. & W. S.C.	H. C. Miller and J. Woods	Spd. & Hndcp.
Aus.	Air Race Australian Entry, Ltd	Harkness & Hillier Monoplane	D. Saville	Spd. & Hndcp.
Aus.	H. W. G. Penny	Cord Vultee, Wright Cyclone F2	H. W. G. Penny	Spd. & Hndcp.
N. Z.	Manawatu Aero Club	Miles Hawk, Gipsy III	Major Cowper	Handicap
N. Z.	R. C. Wallace	Short Scion, Pobjoy Niagara	S. S. Kirsten	Handicap
N. Z.	Messrs. Waugh and Everson	Waugh and Everson Monoplane, Cherub III	Everson	Handicap
N. Z.	N. Z. Centenary Air Race Committee	D.H. Dragon, Gipsy Six	J. D. Hewett and C. E. Kay	Spd. & Hndcp.
N. G.	N. G. Centenary Flight Syndicate	Fairey Fox, Fairey Felix D12	R. Parker and G. E. Hemsworth	Spd. & Hndcp.
Ind.	V. L. Chandi	D.H. Fox Moth, Gipsy Major	A. M. Morad	Handicap
Neth.	Dutch Syndicate	Pander S4, Wright Whirlwind	D. L. Astes and G. J. Geysendorfer	Speed
Neth.	K. L. M.	Fokker F XXXVI, Wright Cyclone	I. W. Smirnoff or G. M. H. Frijns	Handicap
Neth.	K. L. M.	Fokker XXII, P. & W. Wasp	I. W. Smirnoff or G. M. H. Frijns	Handicap
Neth.	K. L. M.	Fokker XVIII, P. & W. Wasp	I. W. Smirnoff or G. M. H. Frihns	Handicap
Neth.	K. L. M.	Douglas DC2, Wright Cyclone	K. D. Parmentier and J. J. Moll	Spd. & Hndcp.
Fr.	Michel Detroyat	Lockheed Orion, Hispano-Suiza	M. Detroyat	Spd. & Hndcp.
Fr.	Vicomte Jacques de Sibour	René Cousinet, Hispano-Suiza	J. de Sibour	Speed
Fr.	Capt. Edouard Corniglion-Molinier	Wibault Penhoet, Hispano-Suiza	Capt. E. C.-M. and Capt. L. Challe	Spd. & Hndcp.
Fr.	André Gueit	Caudron Monoplane, Renault	André Gueit	Handicap
Fr.	M. Fréton	Potez 39, Lorraine Pétrel	M. Fréton and D'Estailleur Chanteraine	Spd. & Hndcp.
Fr.	André de Roussy de Sales and Jean Lacombe	Bernard Monoplane 84, Mistral Major	A. de Roussy de Sales and J. Lacombe	Spd. & Hndcp.
Fr.	Bleriot Aeronautique Société Anonyme	Bleriot III, Gnome et Rhone	Charles Quatremare	Spd. & Hndcp.
It.	Societa Idrovolanti Alta Italia Savoia	Savoia-Marchetti S.79, Piaggio Stella	Adriano Bacula and Alessandro Passaleva	Spd. & Hndcp.
It.	Francis Lombardi	Cantieri Bergamaschi PL3, Fiat A59	F. Lombardi and V. Suster	Spd. & Hndcp.
Ger.	Wolf Hirth	Messerschmitt, BFW HM 8a	Wolf Hirth and Hermann Illg	Handicap
Swed.	Lieut. M. Lindholm	Northrop Delta, P. & W. Hornet	M. Lindholm and G. Lipdow	Spd. & Hndcp.
Port.	C. Cudell Goets	Comper Kite, Pobjoy Niagara	C. C. Goets	Handicap
Den.	Lieut. M. Hansen	Desoutter Mark II, Gipsy III	Lieut. M. Hansen	Handicap

Commercial Operators' Code

Codification of the Commercial Aviation Industry is completed and approved

THE TEXT of the code for the Commercial Aviation Industry is reprinted herewith. Space limitation has necessitated deletion of certain of the relatively less important parts and some of the sections common to other NRA codes.

Particular attention is called to the registration requirement for every member of the industry in Article VII.

Article I—Purposes

To effectuate the policies of Title I of the National Industrial Recovery Act, the following provisions are established as a Code of Fair Competition for the Commercial Aviation Industry, and its provisions shall be the standard of fair competition for such industry and shall be binding upon every member thereof.

Article II—Definitions

1. The term "Commercial Aviation Industry" as used herein includes any and all non-scheduled, miscellaneous flying activities in the aviation industry, as distinguished from scheduled point-to-point air transportation as covered by the Code of Fair Competition for the Air Transport Industry and manufacturing, as covered in the Code of Fair Competition for the Aircraft Manufacturing Industry; the operation and maintenance of airports; the operation and maintenance of all types of aviation schools; the servicing, maintaining, repairing, and storing of aircraft, engines, propellers, parts, instruments, and/or accessories therefor, together with parachutes; the selling and/or distributing at wholesale or retail aircraft, engines, propellers, parts, instruments, accessories, parachutes, and other materials and services appertaining thereto, excluding sales by the manufacturer of his own products at wholesale; and in addition thereto all other types of industries in the field of aviation not included in the two Codes above mentioned, together with such related branches or subdivisions as may from time to time be included under the provisions of this Code.

1. The term "member of the industry" includes, but without limitation, any individual, partnership, association, corporation, or other form of enterprise engaged in the Industry, either as an employer or on his or its own behalf.

2. The term "employee" as used herein includes any and all persons engaged in the Industry, however compensated, except a member of the Industry.

3. The term "employer" as used herein includes anyone by whom such employee is compensated or employed.

4. The term "student" as used herein includes anyone regularly enrolled in a school of aviation for instruction. A student not earning tuition is not to be considered an employee, even though he may be performing work usually assigned to an employee. A student earning his tuition in whole or in part is to that extent to be considered an employee.

5. The terms "President," "Act," and "Administrator" as used herein mean, respectively, the President of the United States, Title I of the National Industrial Recovery Act, and the Administrator for Industrial Recovery.

6. Population for the purposes of this Code shall be determined by reference to the latest Federal Census.

Article III—Hours

Section 1. Maximum Hours.—No employee shall be permitted to work in excess of forty (40) hours in any one week, nor more than eight (8) hours in any one day, nor more than six (6) days in any seven (7) day period, unless for hours worked in excess of eight (8) hours per day or forty (40) per week, he is compensated by not less than one and one-third times the normal rate of pay.

Section 2. Exceptions.—The following are excepted from the hours provisions of Section 1 above:

(a) Mechanics, mechanics' helpers, and employes on emergency maintenance or emergency repair work involving accidents endangering life or property, provided that for hours worked in excess of eight (8) hours per day, or forty-eight (48) per week, they shall be compensated at least one and one-third times their normal rate of pay.

(b) Watchmen, caretakers, and general utility field employees provided that they shall not work more than fifty-four (54) hours in any week, unless in case of emergency, and then they shall be compensated at not less than one and one-third times their normal rate of pay for hours worked in excess of fifty-four (54) per week.

(c) Pilots, provided that they shall not work more than one hundred (100) flying hours per month or as this clause may be modified by the Administrator on recommendation of the Department of Commerce.

(d) Persons employed in managerial, executive, professional capacities, who regularly receive more than Thirty-five ($35.00) Dollars per week.

Section 3. Employment by Several Employers.—No employer shall knowingly permit an employee to work for any time which, when totaled with that already performed with another employer or employers, exceeds the maximum permitted herein.

Article IV—Wages

Section 1. Minimum Wages.—The minimum wage rate in this Industry shall not be less than at the rate of fifteen ($15.00) dollars per week in places of more than 50,000 population or in the immediate trade area thereof nor less than at the rate of thirteen ($13.00) dollars per week in places of 50,000 population or less.

Section 2. Minimum Wage Rates by Locality/Occupation.—After the approval of this Code, the Code Authority may present for approval to the Administrator, after notice and hearing, recommendations as to the upward adjustments in minimum wages for specified regions/occupations in order to effectuate the purposes of the Act.

Section 3. Wages Above Minimum.—There shall be an equitable adjustment of all wages above minimum, and to that end, within sixty (60) days from the approval of this Code, the Code Authority shall submit for the approval of the Administrator a proposal for adjustment in wages above the minimum. Upon approval by the Administrator, after such hearing as he may prescribe, such proposal shall become binding as a part of this Code, provided, however, that in no event shall hourly rates of pay be reduced.

Section 4. Female Employees.—Female employees performing substantially the same work as male employees shall receive the same rate of pay as male employees, and where they displace men they shall receive the same rate of earnings as the men they displace.

Section 5. Handicapped Persons.—A person whose earning capacity is limited because of age, physical or mental handicap, or other infirmity, may be employed on light work at a wage below the minimum established by this Code, if the employer obtains from the state authority, designated by the United States Department of Labor, a certificate authorizing such person's employment at such wages and for such hours as shall be stated in the certificate. Such authority shall be guided by the instructions of the United States Department of Labor in issuing certificates to such persons. Each employer shall file monthly with the Code Authority a list of all such persons employed by him, showing the wages paid to, and the maximum hours of work for such employee.

Article V—General Labor Provisions

Section 1. Child Labor.—No person under sixteen (16) years of age shall be employed in the Industry. No person under eighteen (18) years of age shall be employed at operations or occupations which are hazardous in nature or dangerous to health. The Code Authority shall submit to the Administrator within 30 days after the effective date of this Code a list of such operations or occupations for his approval. In any State an employer shall be deemed to have complied with this provision as to age if he shall have on file a certificate or permit duly signed by the Authority in such State empowered to issue employment or age certificates or permits showing that the employee is of the required age.

Article VI—Organization, Powers and Duties of Code Authority

Section 1. Organization and Constitution.—A National Code Authority is hereby established consisting of 13 voting members to be selected in the following manner:

(a) Eleven (11) of such voting members shall be selected by the Regional Code Authorities hereinafter provided for; each such Regional Code Authority shall select one (1) member by a fair method of selection to be approved by the Administrator.

(b) The twelfth voting member shall be the President of the Independent Aviation Operators of the United States. The thirteenth voting member shall be appointed by the Administrator.

(c) In addition to membership as above provided, there may be one or more members without vote, to be known as Administration Members one (1) of whom may be a representative of the Bureau of Air Commerce, Department of Commerce, and all of whom are to be appointed by the Administrator to serve for such terms as he may specify.

Section 2. (a) In addition to the National Code Authority, there may be constituted eleven (11) Regional Code Authorities of from three (3) to five (5) voting members each, which shall cooperate with the National Code Authority in the administration of this Code in their respective regions.

The boundaries of each region shall be as follows, subject to such future modifications or changes as the National Code Authority, with the approval of the Administrator, may deem necessary.

Region one—Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. Region two—New York, Pennsylvania, New Jersey, Maryland, Delaware, Virginia, and the District of Columbia. Region three—Mississippi, Alabama, Florida, Georgia, North Carolina, and South Carolina and the territorial possession of Puerto Rico. Region four—Kentucky, Ohio, Tennessee, and West Virginia. Region five—Michigan and Indiana. Region six—Nebraska, Colorado, Kansas, and Missouri. Region seven—Minnesota, Wisconsin, Iowa, and Illinois. Region eight—Texas, Oklahoma, Arkansas and Louisiana. Region nine—Washington, Oregon, and Alaska. Region ten—Idaho, Montana, Wyoming, North Dakota, and South Dakota. Region eleven—California, Utah, Nevada, Arizona, New Mexico, and Hawaii.

The members of such Regional Code Authorities shall be selected by the members of the Industry in each region by a fair method of selection to be determined by the National Code Authority subject to the approval of the Administrator.

(b) In addition to membership on such Regional Code Authorities as above provided, there may be one or more members without vote, to be known as Administration Members one (1) of whom may be a representative of the Bureau of Air Commerce, Department of Commerce, and all of whom are to be appointed by the Administrator and shall serve for such terms as he may specify.

Section 3. (a) Where necessary to properly effectuate the purposes of the Act or of this Code, the National Code Authority, on recommendation of a Regional Code Authority, shall provide for such Divisional or Local Code Authorities, or both, for such areas within the region of such Regional Code Authority, as the National Code Authority deems advisable, subject to the approval of the Administrator. Such Divisional or Local Code Authorities, or both, shall consist of three (3) voting members to be selected by the members of the Industry in the particular area by a fair method of selection to be determined by the Regional Code Authority, and approved by the Administrator.

(b) In addition to membership as above provided, there may be one or more members without vote to be known as Administration members, to be appointed by the Administrator to serve for such terms as he may specify.

Section 4. Temporary Organization.—Pending selection of eleven (11) regional voting members of the National Code Authority, as hereinabove provided in Section 1 of this Article such voting members shall be appointed by the Administrator and shall continue in office until their successors are selected as above provided.

Section 5. Each trade or industrial association directly or indirectly participating in the selection or activities of the Code Authority shall (1) impose no inequitable restrictions on membership, and (2) submit to the Administrator true copies of its articles of association, bylaws, regulations and any amendments when made thereto, together with such other information as to membership, organization, and activities as the Administrator may deem necessary to effectuate the purposes of the Act.

Section 6. In order that the Code Authorities shall at all times be truly representative of the Industry and in other respects comply with the provisions of the Act, the Administrator may prescribe such hearings as he may deem proper; and thereafter if he shall find that the Code Authorities, or any of them, are not truly representative or do not in other respects comply with the provisions of the Act, may require an appropriate modification of the Code Authorities, or any of them.

Section 7. If the Administrator shall at any time determine that any action of a Code Authority or any agency thereof may be unfair or unjust or contrary to the public interest, the Administrator may require that such action be suspended to afford an opportunity for investigation of the merits of such action and further consideration by such Code Authority or agency pending final action which shall not be effective unless the Administrator approves or unless he shall fail to disapprove after thirty (30) days' notice to him of intention to proceed with such action in its orginal or modified form.

Section 8. If a member of this Industry is also a member of another Industry for which a Code has been approved this Code shall apply only to that part of his business which is properly included under this Code.

Section 9. Nothing contained in this Code shall constitute the members of the Code Authorities partners for any purpose. Nor shall any member of the Code Authorities be liable in any manner to anyone for any act of any other member, officer, agent, or employee of the Code Authorities. Nor shall any member of the Code Authorities, exercising reasonable diligence in the conduct of his duties hereunder, be liable to anyone for any action or omission to act under this Code, except for his own willful malfeasance or nonfeasance.

Section 10. The National Code Authority may appoint a committee to confer with committees or representatives of the Air Transport Industry and/or other related industries for the purpose of establishing such an Industrial Relations Board as they may deem desirable to adjust by conference and negotiation any controversy concerning hours, wages, and conditions of employment, or compliance with the labor provisions of the code or codes governing the respective industries.

Section 11. Powers and Duties.—Subject to such rules and regulations as may be issued by the Administrator, the National Code Authority shall have the following powers and duties, in addition to those authorized by other provisions of this Code.

(a) To insure the execution of the provisions of this Code and provide for the compliance of the Industry with the provisions of the Act.

(b) To adopt bylaws and rules and regulations for its procedure.

(c) To obtain from members of the Industry such information and reports as are required for the administration of the Code. In addition to information required to be submitted to the National Code Authority, members of the Industry subject to this Code shall furnish such statistical information as the Administrator may deem necessary for the purposes recited in Section 3 (a) of the Act to such Federal and State agencies as he may designate; provided that nothing in this Code shall relieve any member of the Industry of any existing obligations to furnish reports to any Government agency. No individual report shall be disclosed to any other member of the Industry or any other party except to such other Governmental agencies as may be directed by the Administrator.

(d) To use such trade associations and other agencies as it deems proper for the carrying out of any of its activities provided for herein, provided that nothing herein shall relieve the Code Authority of its duties or responsibilities under this Code and that such trade associations and agencies shall at all times be subject to and comply with the provisions hereof.

(e) To make recommendations to the Administrator for the coordination of the administration of this Code and such other codes, if any, as may be related to or affect members of the Industry.

(f) 1. It being found necessary in order to support the administration of this Code and to maintain the standards of fair competition established hereunder and to effectuate the policy of the Act, the National Code Authority is authorized:

(a) To incur such reasonable obligations as are neecssary and proper for the foregoing purposes, and to meet such obligations out of funds which may be raised as hereinafter provided and which shall be held in trust for the purposes of the Code;

(b) To submit to the Administrator for his approval, subject to such notice and opportunity to be heard as he may deem necessary (1) an itemized budget of estimated expenses for the foregoing purposs, and (2) an equitable basis upon which the funds necessary to support such budget shall be contributed by members of the Industry;

(c) After such budget and basis of contribution have been approved by the Administrator, to determine and obtain equitable contribution as above set forth by all members of the Industry, and to that end, if necessary, to institute legal proceedings therefor in its own name.

2. Each member of the Industry shall pay his or its equitable contribution to the expenses of the maintenance of the National Code Authority, determined as hereinabove provided, and subject to rules and regulations pertaining thereto issued by the Administrator. Only members of the Industry complying with the Code and contributing to the expenses of its administration as hereinabove provided, (unless duly exempted from making such contribution) shall be entitled to participate in the selection of members of the Code Authority or to receive the benefits of any of its voluntary activities or to make use of any emblem or insignia of the National Recovery Administration.

3. The National Code Authority shall neither incur nor pay any obligation substantially in excess of the amount thereof as estimated in its approved budget, and shall in no event exceed the total amount contained in the approved budget except upon approval of the Administrator; and no subsequent budget shall contain any deficiency item for expenditures in excess of prior budget estimates except those which the Administrator shall have so approved.

(g) To recommend to the Administrator any action or measures deemed advisable, including further fair trade practice provisions to govern members of the Industry in their relations with each other or with othe trades and/or industries; measures for industrial planning, and stabilization of employment; and including modifications of this Code which shall become effective as part hereof upon approval by the Administrator after such notice and hearing as he may specify.

(h) To appoint a Trade Practice Committee which shall meet with the Trade Practice Committees appointed under such other codes as may be related to the Industry for the purpose of formulating fair trade practices to govern the relationships between employers under this Code and under such other codes to the end that such fair trade practices may be proposd to the Administrator as amendments to this Code and such other codes.

(i) To provide appropriate facilities for arbitration, and subject to the approval of the Administrator, to prescribe rules to effect compliance with awards and determinations.

(j) To elect officers and committees and assign to them such duties and powers as it may consider advisable, and to provide for its own procedure as the administration agency of this Code.

Section 12. The Regional Code Authorities shall have the following powers and duties subject to the review of the National Code Authority, and subject always to such rules and regulations as may be issued by the Administrator.

(a) To adopt bylaws and rules and regulations for their procedure.

(b) To elect officers and committees and assign to them such duties and powers as may be considered advisable.

(c) With the approval of the National Code Authority and the Administrator to make such additional regional regulations and trade practice rules as shall be necessary to accomplish the purposes of this Code and to allow, where necessary, divisional or local Code Authorities to make such divisional or local regulations and trade practice rules as are necessary to accomplish the purposes of this Code.

Article VII—Registration

Section 1. Every member of the Industry shall, within sixty (60) days after the effective date of this Code, or within ten (10) days after becoming a member of the Industry, and annually thereafter, register with the National Code Authority his name, together with a description of the nature of his business operations and such other information as may be required by the National Code Authority with the approval of the Administrator.

Section 2. After sixty (60) days after the effective date of this Code it shall be a violation of this Code for any member of the Industry to operate a business coming under the provisions of the Code of Fair Competition for the Commercial Aviation Industry as defined in Article II without registering as provided in Section 1 above.

Section 3. The cost of such registration and such insignia may be assessed against each member of the Industry as a registration fee, subject to the approval of such fee by the Administrator.

Article VIII—Cost and Price Cutting

Section 1. The standards of fair competition for the industry with reference to pricing practices are declared to be as follows:

(a) Wilfully destructive price cutting is an unfair method of competition and is forbidden. Any member of the Industry or of any other industry or the customers of either may at any time complain to the National Code Authority that any price charged for any specific product, commodity or service by any member of the Industry constitutes unfair competition as destructive price cutting, imperiling small enterprises or tending toward monopoly or the impairment of code wages and working conditions. The National Code Authority shall within five (5) days afford an opportunity to the member complained against to answer such complaint and shall within fourteen (14) days make a ruling or adjustment thereon. If such ruling is not concurred in by either party to the complaint, all papers shall be referred to the Research and Planning Division of NRA which shall render a report and recommendation thereon to the Administrator.

(b) When no declared emergency exists as to any given product, commodity or service, there is to be no fixed minimum basis for prices. It is intended that sound cost estimating methods should be used and that consideration should be given to costs in the determination of pricing policies.

(c) When an emergency exists as to any given product, commodity or service, sale below the stated minimum price of such product, commodity or service, in violation of Section 2 hereof, is forbidden.

Section 2. Emergency Provisions:

(a) If the Administrator, after investigation, shall at any time find both (1) that an emergency has arisen within the Industry in any region or division adversely affecting small enterprises or wages or labor conditions, or tending toward monopoly or other acute conditions which tend to defeat the purposes of the Act; and (2) that the determination of the stated minimum price for a specified product, commodity or service within the Industry, Region or Division for a limited period is necessary to mitigate the conditions constituting such emergency and to effectuate the purposes of the Act, the National Code Authority may cause an impartial agency to investigate costs and to recommend to the Administrator a determination of the stated minimum price of the product, commodity or service affected by the emergency and thereupon the Administrator may proceed to determine such stated minimum price.

(b) When the Administrator shall have determined such stated minimum price for a specified product, commodity or service for a stated period, which price shall be reasonably calculated to mitigate the conditions of such emergency and to effectuate the purposes of the National Industrial Recovery Act, he shall publish such price. Thereafter, during such stated period, no member of the Industry, Region or Division shall sell such specified product, commodity or service at a net realized price below said stated minimum price and any such sale shall be deemed destructive price cutting. From time to time, the National Code Authority may recommend review or reconsideration or th Administrator may cause any determinations hereunder to be reviewed or reconsidered and appropriate action taken.

Article IX—Cost Finding and Accounting

Section 1. The National Code Authority may cause to be formulated methods of cost finding and accounting capable of use by all members of the Industry, and shall submit such methods to the Administrator for review. If approved by the Administrator, full information concerning such methods shall be made available to all members of the Industry. Thereafter, each member of the Industry shall utilize such methods to the extent found practicable. Nothing herein contained shall be construed to permit any Code Authority, any agent thereof, or any member of the Industry to suggest uniform additions, percentages or differentials or other uniform items of cost which are designed to bring about arbitrary uniformity of costs or prices.

Section 2. Members of the Industry who perform work usually assigned to employees, shall include, in their costing, wages for such work at the current rate of pay common to that region.

Section 3. Members of the Industry who employ students on work usually assigned to employees shall include in their costing wages for such services at the current rate of pay common to that region for the class of work performed and the evaluation of the services given.

Article X—Trade Practice Rules

This article, which we do not reprint verbatim, prohibits such practices as inaccurate advertising, false billing, inaccurate labeling, defamation of competitors, threats of lawsuits to intimidate competitors, secret rebates, bribing employees, inducing breach of existing contracts, coercion, and black-listing.

Some expert testimony on the question of

Who Buys Airplanes and Why?

Times have changed. The average man who buys an airplane for personal use today puts on more hours in the first 90 days than his predecessor of 1930 logged in a whole year, —and he flies in all kinds of weather.

By Hugh Perry

Sales Manager, Waco Aircraft Company

IT IS rather interesting that the writer should be asked to give the readers of AVIATION some sort of an answer to the question "Who Buys Airplanes and Why?" because in January, 1930, a report on this very topic was the first job assigned to him upon joining the Waco organization. It is a question, of course, that is paramount in the minds of all aircraft executives and sales personnel and my instructions were to get the answer by fair means or foul.

A series of questionnaires to owners, a series of pleading letters to our dealers and distributors brought forth a mass of interesting information. We determined, for example, that of the owners of our planes (regardless of model or length of ownership) about 53 per cent reluctantly admitted private ownership, that is, they had purchased the airplane with no particular object in view but the pleasure of flying, or the advertising or sale of some product in no way connected with the aeronautical industry. This, of course, excluded the oil companies who have been steady and consistent users of airplanes in the promotion and sale of aviation gasoline and oil. It likewise excluded engine, instrument, tire and other accessory manufacturers who have also used our flying equipment but who should be classified strictly as intra-industry.

It was impossible after the 1930 survey to place a finger on any particular class, profession or type of individual particularly addicted to personal flying, although at that time it seemed that the airplane was somewhat more readily accepted by the mechanically minded. Today even this tendency fades almost entirely from the picture. The only possible classification that might be applied to private owners today is that they are "modern," though not exclusively "young modern" by any means. Meeting them personally, reviewing their histories and careers, they seem to be inevitably "go-getters" in whatever line of work or profession they may have selected. More often than not, they are leaders in the business, social, or sporting life of their community, frequently in all three, as a few examples lifted at random from our own album will serve to indicate.

It is not surprising that David Ingalls, former Assistant Secretary of the Navy for Aeronautics, should continue to use a personal airplane for all types of travel. His use of an airplane may be classified largely as pleasure flying.

Bruce Dodson, outstanding in the insurance circles in the Middle West, with headquarters in Kansas City, consistently uses a number of airplanes solely for the promotion of business. Mr. Dodson enjoys flying and the stimulus of arriving on the job with no waste of time and with a degree of mental alertness that cannot be maintained in other forms of travel.

Fred Harvey, of hotel, dining car and restaurant fame, and his friend, Dr. Don Tresidder, president of the Yosemite Park and Curry Company, both divide their flying time fairly well between the promotion of their business and pleasure touring, as do Author William Faulkner and Film Director Henry King of Fox studios.

The four members of the du Pont family now owning our ships would, no doubt, classify the bulk of their flying as purely for pleasure and for pleasant per-

sonal travel. Warren Tremaine's ship, on the other hand, spends the bulk of its flying hours transporting him from one to another of his four ranches in Arizona and keeping him in touch with his business offices in Phoenix.

Dr. John Brock's optical business in Kansas City is probably not greatly affected by his flying. His ardent promotional efforts for aviation as a whole might well warrant his being classified as a flying philanthropist. Captain Allan Hancock of Santa Maria, Cal., undoubtedly belongs to the same group, but Captain Hancock's philanthropies are general and Dr. Brock's are aviational, if such a word may be permitted.

William B. Harding heads a long list of stock broker owners, but due to his regular visits to the many branch offices of his company, he probably can be classified more nearly as a business user than his fellow brokers, most of whom fly for pleasure.

Both Frank and Edmund Ball of the Ball Brothers Glass Company, Muncie, Ind., have devoted many flying hours to promotion of the company's business. Both are ardent sportsman pilots and attend aviation events of all kinds whenever their business will permit.

Such a listing might be continued more or less indefinitely but it serves to give some conception of the type of people who buy and use airplanes for private purposes.

Sell flying first

The big problem that we of the industry who cater to private ownership face, is, of course, the selling of flying rather than the selling of airplanes. All of us who have weathered the depression years have developed ambitious sales plans, but we must admit that in this field we have received a lift from the airlines. It is quite evident to us from time to time that many of our purchasers considered private flying only after a reasonably extensive use of the airlines for their business or personal travel. They have appreciated how greatly their scope could be enlarged with a ship of their own in which they would not be confined by either schedules or fixed routes.

Perhaps the most interesting phase of the private ownership field is in the kind and amount of flying which owners are doing. Among the questions asked in our 1930 survey was the number of hours they had used their ships in the last, or in any, calendar year. The answers varied from a minimum of 25 to a maximum of 450. The average was slightly less than 175 hours. Average buyers today put more than this amount of time on their airplanes long before the 90-day guarantee has expired, and it is not unusual to find an owner who puts from 600-800 hours on his plane in its first year of operation. In 1930 very few owners whose home base was over 500 miles from our factory ever came in for any sort of service. Today it is not unusual to have our West Coast owners drop in two or three times a year, not, of course, flying in for service, but merely stopping by in the course of their travels. In our own trips across country to call on our distributors and dealers, we are constantly meeting them or crossing their trails. It is a source of satisfaction to learn that they are really using their airplanes and getting their value from them.

A moral tale

The story of one owner who took delivery of one of our cabin planes in the middle of November, two years ago, well illustrates the process. At that time he had had fifteen hours of solo flying in an open ship but no time on cabin types. He made two statements to me before he left the factory which I was to recall very clearly within the ensuing months—first, that he had no intention of flying his cabin plane solo until he had completed 100 hours on the open ship on which he had started his instruction, and second, that his pleasure in ownership of a personal plane was tempered by the fact that his wife was unalterably opposed to flying and that he would have to do his flying alone. He commented on their close companionship and the fact that they had always enjoyed motor trips together so greatly that it was unfortunate that her attitude toward flying was so severe.

In the first week of the following February I had occasion to go to the West Coast and at El Paso the airport manager mentioned a certain Waco ship which had been on the field a few days before it had headed back to Northern New York. He went on to say that the owner had stopped on his way out, and had since been to Los Angeles, San Francisco, and Seattle. I recognized the ship as belonging to my customer of the preceding November and asked who his pilot was. I was surprised to learn that he had no pilot and that he was accompanied only by his wife. I must confess that I mentioned this incident with some fear and trembling to the distributor who sold the airplane when I had occasion to write him a few days after my return, as I had visions of uncovering a bit of scandal in case the El Paso airport manager had made a mistake. I was quickly reassured, however, when I learned that the wife's reluctance to fly was a thing of the past and that she was actually considering taking instruction. In fact, a few months later I learned that she had successfully finished her course and was now flying the family plane herself.

Trends in equipment

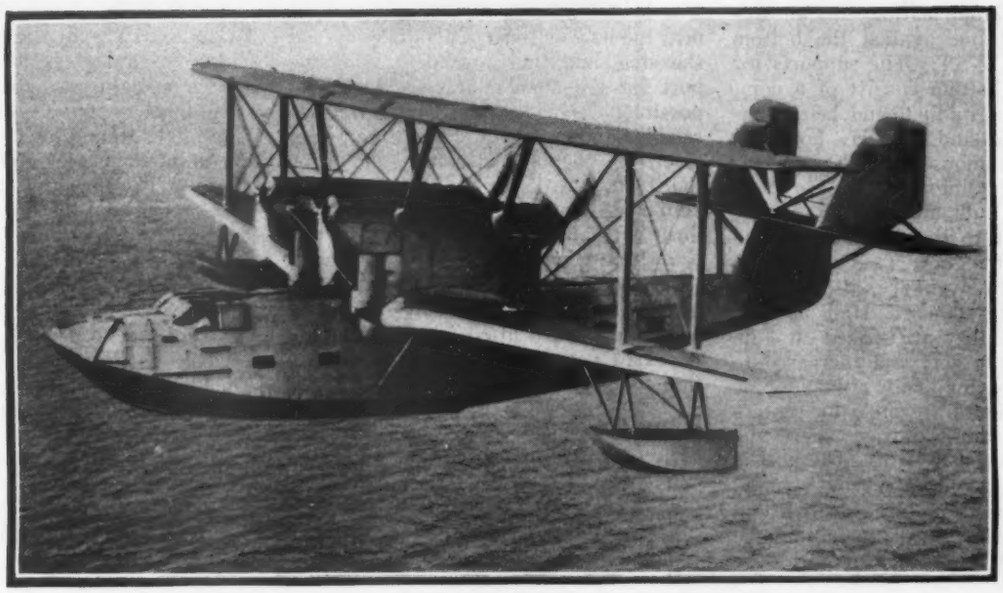
Another indication of the present trend of private flying is the type of equipment that is being bought with the planes. In 1930 practically all of our airplanes were delivered with the minimum of flying instruments, even the airspeed was extra. Most of the flying seems to have been done either entirely at the home airport or on comparatively short cross-country trips in the best flying weather. Today our owners with private licenses in their pockets are successfully barging out on all sorts of cross-country expeditions, night or day, in all kinds of weather. This is evident not only from personal contacts with them but more so from the increasing purchase of night and blind flying equipment.

In 1933 our four-place cabin model was offered with standard equipment at the factory for $6,000. An analysis of actual sales shows that the average delivered price was about $7,033. In other words, customers purchased about $1,000 worth of extra navigational equipment, clearly not for the purpose of decorating the airplane or weighting it down unnecessarily. It may be asked why this equipment was not regularly furnished with the airplanes. We have been accused many times of being in the same position as the automobile manufacturer of 1910 who had won only the first scrimmage when he sold an automobile, and had his real battle in adding to it windshield, headlights, top, side curtains, bumpers, etc. The answer, of course, is that such items become standard equipment only when the majority of customers buy them on all ships. It is not good policy to penalize the owner with added weight and cost for equipment which he does not need. Neither is it particularly good sales policy to build up the sale price of an airplane to include equipment which can be obtained by the purchaser at the same extra cost that would be charged if it were included in the standard airplane. Manufacturers catering to the private owner, however, are continually increasing the amount of standard equipment which they place on airplanes to meet growing demands.

Radio

Radio, of course, plays an increasingly important part in both blind and night flying. Many radio manufacturers have recognized the need and have already developed equipment to appeal specially to the private airplane owner. Modern purchasers are quick to take advantage of this added safeguard even at the extremely high prices that combined radio and shielding, bonding, etc., still command. As with the airplane itself, volume alone will bring these items down in price.

Summing up, "Who Buys Airplanes?"—the man or woman regardless of age or station who is brought to the realization of the true pleasure of flying, the relaxation on long trips, the real freedom of the air and the endless entertainment of going places and seeing, and doing things. That also answers the remaining half of the question, "Why?"



Navy's Giant

The experimental XP2H-1 patrol boat by the Hall Aluminum Aircraft Corporation

THE current interest in flying boats of very large size exhibited in this country and abroad, offers sufficient inducement to go back into history a year or two, to examine some of the details of the largest flying boat ever produced for the United States Navy, the experimental XP2H-1, designed and built by the Hall-Aluminum Aircraft Corp. at Buffalo. This machine is about twice as large as any other naval service type. In view of the fact that it is a biplane with an extreme span of 112 ft., the application of the term "gigantic" is well warranted. Its weight empty (structure, 9,625 lb.; power plant, 8,617 lb.; fixed equipment, 2,174 lb.) totals 20,417 lb. Fitted as a patrol boat its normal weight is 34,800 lb.; as a bomber, 34,980 lb. It has been taken off the water, however, with an all-up weight of 43,000 lb., a truly remarkable performance. It has a top speed of 140 m.p.h.

Although the objective of the present article is to go into some of the structural details that characterize Hall-built airplanes in general, and have been applied to XP2H-1 in particular, a few of the water and flight characteristics are worthy of note. The hull for example, is an enlargement of the XPH series. Towing tests on PH-1 models in the N.A.C.A. tank indicated an unusual ratio of displacement to resistance at hump speed, the figure being 6.3 as against the usual 5.

In the air, the ship can be flown on any two of its four Curtiss-Wright Geared Conqueror engines. The performance with the two tractor engines alone is not materially different from that with the two pusher engines alone, a type of behavior difficult to obtain with radial engines in tandem. The selectivity of power plant offers considerable extension of cruising range. Taking off with 42,500 lb. gross (3,400 gal. fuel) and cruising at 120 m.p.h. with four engines, the calculated range is 3,603 miles. Using four, three, and two engines successively as required (at most economical cruising speed) the range may be extended to 4,560 miles. With all four engines running throughout at most economical speed, the range is about 4,250 miles.

All-aluminum construction

Outstanding feature of the Hall patrol boat is its almost exclusive use of aluminum alloys. Except for the fabric wing cover, the lift and drag wires, and the engine bearers, no other materials are employed. This fact in itself accounts for the relatively high ratio of useful load to gross weight, but in this case more has been undertaken than the mere substitution of aluminum alloy for other materials. Not only have the principal members been correctly proportioned to handle their loads, but an extended study was made of every detail of the structure, regardless of any seeming unimportance, to apply the proper design factors. Special study has also been made of the flexure patterns of members subjected to combined types of loading. The effective strength of such members subjected to double curvature deflection has been enhanced by restraining their ends by suitable fittings. In cases of single curvature deflection, end fixation has been avoided. Drag struts, for example, are connected to the main spars through ball and socket fittings.

In the XP2H-1, rivetted joints are employed throughout. Particular attention has been paid, however, to reduce the actual number of rivets to a minimum, and to design all members so that rivetting machines may be used conveniently whenever possible. For example, the spar construction is such that there are, on the average, only three rivets per lineal foot. Other rivets are required for securing the trailing edge to the rib and for attaching braces to spars and end ribs, but the fastenings of the sheet metal nose piece account for more than half the total number of rivets in the entire wing structure.

Hull details

The hull has an overall length of 67 ft. 6¼ in., the beam is 11 ft. 5 in. and the maximum depth 10 ft. 1⅜ in. It is of the single step pattern along lines developed from Bureau of Aeronautics specifications. The sides and deck above the water line are of a rounded contour. Where the lower wing panels intersect, the junctions are faired with 12 in. fillets.

The whole structure is entirely of 17-

ST alloy. Bottom plating and all sections of the frame against the bottom are of Alclad 17-ST. The supports for the deck and bottom consist of a combination of longitudinal and belt framing. All frames and stringers, however, are fully continuous through each intersection. Framing members are made up of hollow bulb angles with flanges cut away next to the skin where the continuous stringers pass through. Stringers themselves are also hollow bulb angles of standard Hall pattern. On the bottom they are spaced on 4 in. centers near the keel and increased to almost 6 in. spacing at the chines. Side and deck stringers are on 6 in. centers except under the walkway where the spacing is reduced to 4 in. The keel is of sheet metal, reinforced by rivetted U-shaped channels and provided with an upper flange of 2½ in. diameter flanged tubing, continuous from bow to stern. The keel depth varies from about 8 in. near the bow or stern to about 20 in. near the step, and thus provides rigid support for the cross-framing. As far as possible, stringers and skin are assembled and rivetted together in a power rivetting machine prior to assembly on the frame. All rivetting is of the "dimpled" type which leaves rivet-heads flush with outside surfaces, without any projection whatever.

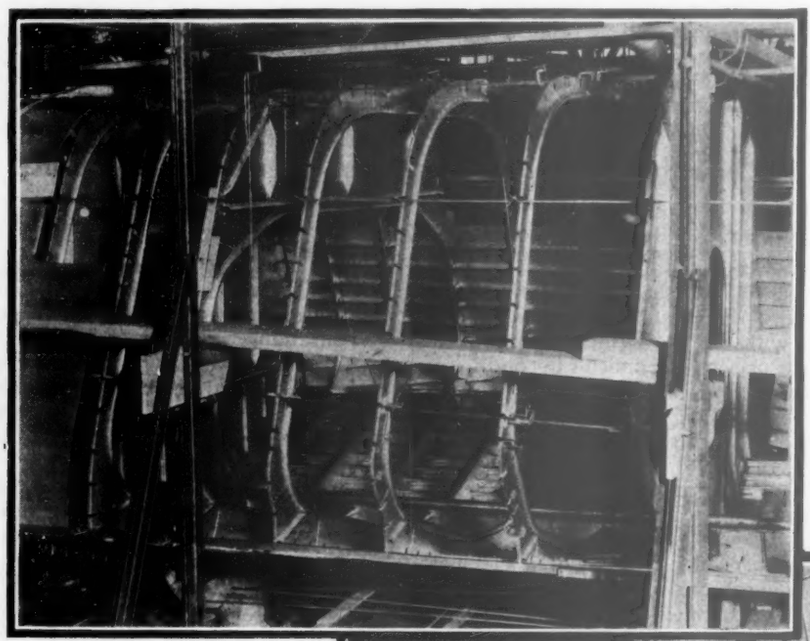
At intervals, fore and aft, the normal cross-frames are replaced by solid bulkheads which are fitted with water-tight doors to provide five emergency flotation compartments.

Wing tip floats

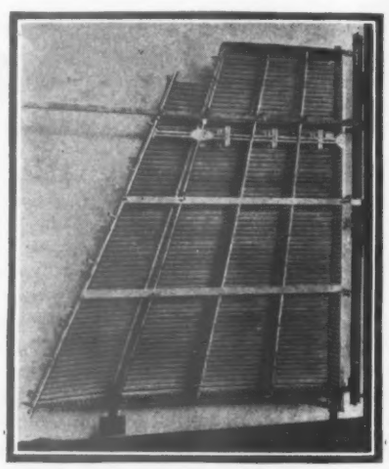
In general, the construction of the two wing-tip floats corresponds to that of the main hull, consisting of Alclad skin over dural framing.

Total wing area of the biplane cellule is 2,608 sq.ft. of which slightly over 1,370 sq.ft. are in the top wing. The Clark Y airfoil is the basic section, modified slightly as to thickness-chord ratio from center section to tip. The span is 112 ft. and the chord varies from 185 in. at the center section to 85 in. at the tip. The upper wing is made up of three panels and the lower of four. The structure is wholly of duralumin except for the steel bracing wires. Nose stiffeners and walkways are of smooth dural sheet but elsewhere the covering is of doped cotton fabric.

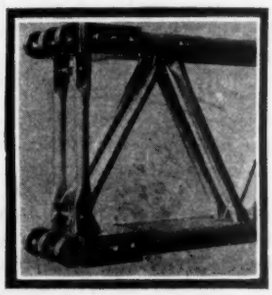
The wing spars are a typical Hall development, with multi-tubular chord and lattice web members connected together at each intersection point by a single pin. The cross-sectional area of the chord members is varied approximately with the maximum loads along the length of the spar by adding to or subtracting from the total number of tubes,



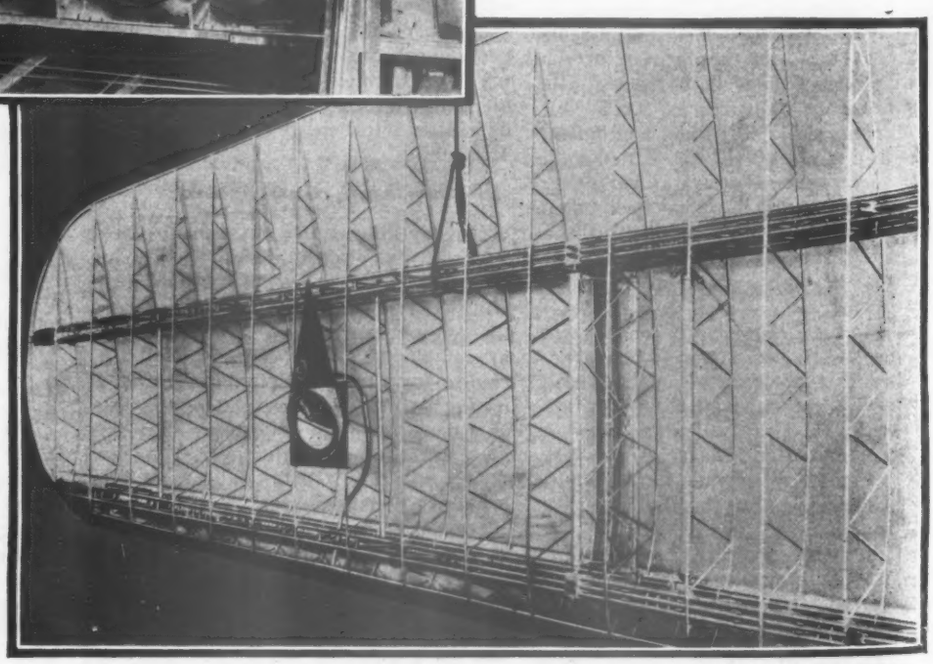
Cross - framing, bulkheads, stringers, and plating aft of main step during assembly.



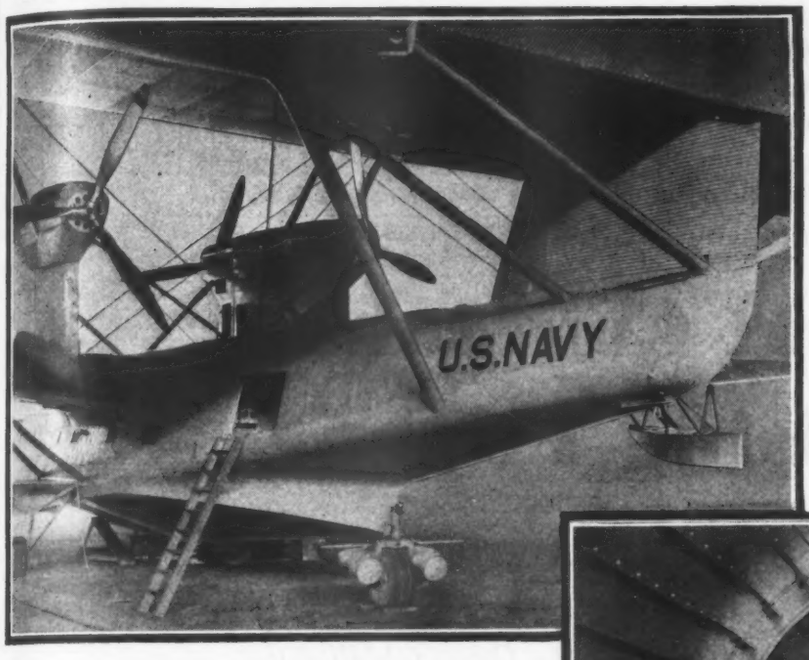
Use of corrugated metal on a fin.

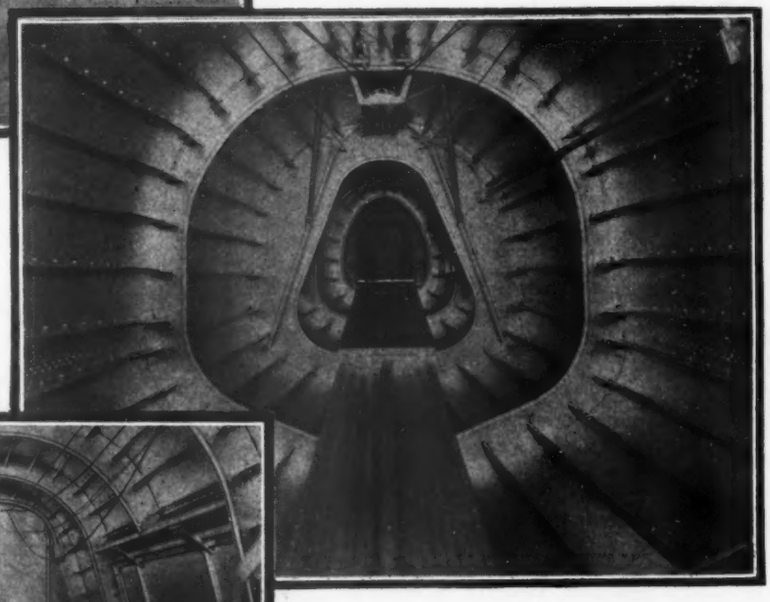


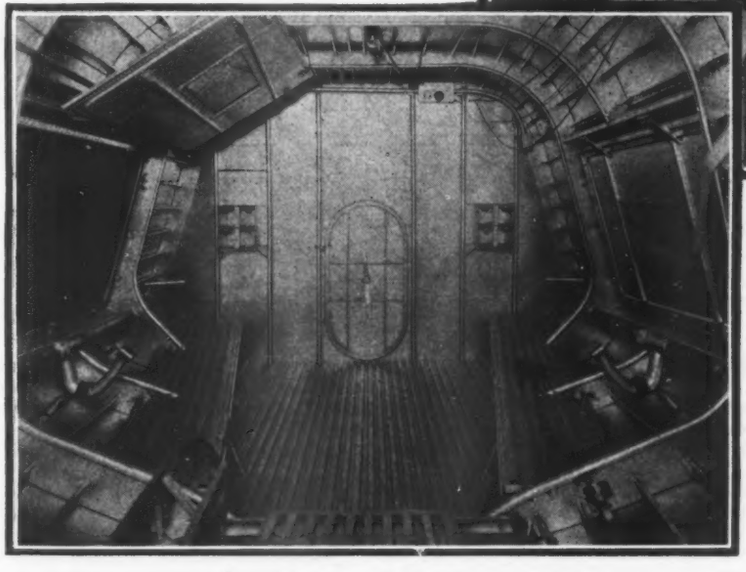
A typical spar fitting. Note single-rivet fastenings at all intersections.



The uncovered wing. Note multi-tubular spars and the simple system of drag bracing.







Above: Stern details. Nacelle and wing stub fairings can be seen, as well as beaching gear.

Right: Interior view astern. The method of preserving the continuity of cross-frames and stringers is indicated.

Below: Looking forward toward a main bulkhead from a rear hull compartment.

Tail surfaces are built up of ribs and spars consisting of 17-ST angle chords and corrugated 17-ST sheet webs. All surfaces are covered with corrugated 17-ST sheets. The average weight of the completed tail surfaces is 1.26 lb. per sq.ft.

The four Curtiss GV-1570-D engines, are mounted between the wings, and supported from the lower wing stubs. The entire nacelle structure and its cowling is of 17-ST alloy except for the actual engine bearers, which are of steel tube. Between the two engines in each nacelle, is a gasoline tank of 580 gal. capacity with a 100-gal. oil tank immediately above it. In each of the wing stubs there are two additional tanks of 625 gal. and 305 gal. respectively. The upper center sections over each nacelle also carry one additional 170-gal. tank on each side. Fuel capacity is 3,360 gal.

An important element in the handling of such large boats is the design and method of attaching beaching gear. In this case the gear consists of two 28x12-in. solid tired wheels mounted in a tubular frame for each of the front trucks, and a single 28x12-in. solid tire wheel for the stern truck. The side wheel frames are connected to the underside of the wing stubs by ball and socket joints, the ball head of each strut being held in place by a hook when the vessel is afloat. The frames are also connected to the hull near the chines by ball and socket joints, and by a pin in the forward joint. The connecting pins are provided with long handles and are pointed for easy insertion. The rear wheel frame is attached by inserting its upper end into a socket and pushing it forward. When fully in, a ring encloses the strut and a pin is inserted to hold the ring in place. The rear wheel castors through 360 deg. and is provided with a capstan bar for steering.

or by varying the diameter or thickness of the individual tubes where necessary.

The drag bracing system consists of Stewart Hartshorn square-rolled wire and duralumin tubes with the ball and socket end fittings mentioned above. Interplane bracing consists of Hartshorn streamline wire and lift struts of round tubing with sheet metal fairings. All fittings are machined from forged 17-ST bar.

The web members of the ribs are made up also of duralumin tubing flattened at the end, and inserted into chord members of flanged tubing formed by drawing sheet dural through a die. After bending to the required rib contour, the flanged tube chords are assembled with the web members in a steel jig and fastened by means of a single rivet at each intersection.

Ailerons are hinged at the upper surface which is narrower than the lower surface. They are differentially operated, having an up motion of about twice as great as the down motion.

In previous articles the authors have presented several types of cruising charts and explained their logical development. The present article is devoted to methods of simplifying and combining the graphical material so that a single chart may be devised that will furnish sufficient information to enable pilots to control cruising conditions in flight. The chart development is based on the extensive test flights of the Douglas DC-2 transport.

Piloting Control in Cruising Flight

OPERATION AT DESIRED CRUISING CONDITIONS, PART SEVEN

By Edmund T. Allen and W. Bailey Oswald

IT IS CONVENIENT for the use of the pilots and airline technicians to have plotted on one chart all or sufficient of the engine characteristics or other factors to enable them to control definitely the cruising operation. Various combinations can be made of the three individual charts (Figs. 23, 24 and 25, AVIATION, September, 1934), in which were shown respectively the variation of velocity with altitude for constant values of engine power, r.p.m., and intake manifold pressure. A chart in which indicated velocity is used is discussed later as an alternate method of control.

The combination charts are particularly necessary because the pilot must depend upon certain instruments to furnish a method of regulating velocity and engine power, since these characteristics are not directly controllable. Percentage of rated engine power is a necessary guide for cruising reliability, fuel consumption, etc., but cannot be used for cruising control because the pilot has no instrument that directly indicates engine power.

For a given propeller pitch setting on a particular airplane, the velocity at any set of atmospheric conditions of temperature and pressure (or pressure altitude) is determined by specifying any one of the three engine characteristics. It follows both from study of the individual charts and from theoretical considerations that a given velocity is obtained in level flight at the expense of a certain quantity of power, which requires particular values of r.p.m. and manifold pressure. For example, according to Fig. 28, at an altitude of 11,500 ft. with a temperature of 45 deg. F., 200 m.p.h. is developed when either 72 per cent power, 1,805 r.p.m., or 27.4 in. of mercury intake manifold pressure is obtained.

All three engine characteristics are dependent and must be obtained together, assuming, of course, correct operation of the engine and a gross weight of the airplane not far different from standard.

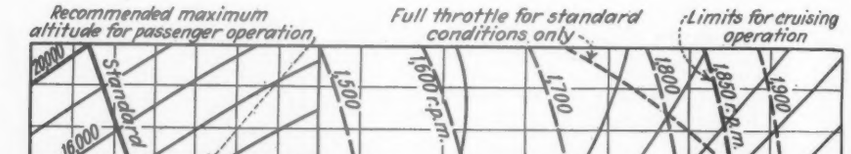


Fig. 26: Control of cruising by engine revolutions chart shows velocity and percentage of rated engine power for any altitude and atmospheric temperature as depending on engine revolutions. Density altitude conversion scale is used except for limiting full-throttle and manifold pressure lines which make use of the simple pressure altitude scale. (Douglas DC-2. Propeller pitch 34.5 deg. at 42 in. radius; diameter 11 ft.)

Example: At 11,500 ft. pressure altitude (altimeter reading) and 45 deg. F. temperature, locate pressure altitude at point (1) move along the diagonal lines to point (2) for density altitude = 13,300 ft. (at 45 deg. F.) [or move up the 45 deg. F. line to 11,500 ft. diagonal line at point (2)]. Move horizontally into the chart and obtain 1,805 r.p.m. and 72 per cent power for true velocity of 200 m.p.h. point (3) at manifold pressure and full throttle limits use pressure altitude only. At 1,000 ft. pressure altitude point *(a)* move horizontally into the chart to the 30 in. Hg. manifold pressure limit at point *(b)* giving 169 m.p.h.

The manifold pressure reading might fall out of line if the engine is not in good mechanical condition, while large changes in weight will modify all values as explained in earlier articles.

It is evident then that the desired combination chart should contain curves for various constant percentages of rated engine power, and in addition.

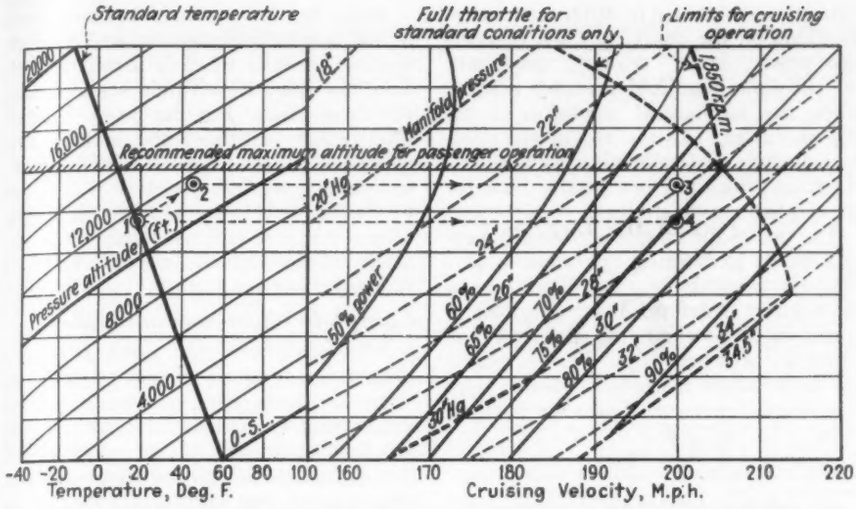


Fig. 27: Control of cruising by intake manifold pressure. Chart shows velocity and percentage of rated engine power for any altitude and atmospheric temperature as a function of intake manifold pressure. Simple pressure altitude scale is used with manifold pressure and full-throttle line, but the density altitude conversion scale is used with per cent power. (Douglas DC-2. Propellers set in high pitch at 34.5 deg. at 42 in. radius; diameter 11 ft.)

Example: At 11,500 ft. pressure altitude and 45 deg. F., locate pressure altitude ordinate at (1) and density altitude ordinate at point (2). At 200 m.p.h., the per cent power is found at point (3) along a horizontal line from point (2) to be 72 per cent; the m.p. is found at point (4) along the horizontal line from point (1) to be 27.4 in. Hg. (Note the two vertical positions required.)

curves either for constant r.p.m. or intake manifold pressure. The latter curves are used for the direct control of operating conditions. Where experience justifies the additional complication, it is believed to be desirable to include all three characteristics on the one chart.

Simplified cruising charts

The simplified cruising chart shown in Fig. 26 contains the per cent engine power and r.p.m. lines. This type of chart is now in use on certain airlines. It appears to have the principal requisites for cruising control. Governing cruising conditions by r.p.m. has the advantages chiefly that (1) the density altitude scale is used for ordinate both for obtaining per cent power, and r.p.m. (2) r.p.m. is a correct measure of power independent of the mechanical condition of the engine, (3) (of questionable value), r.p.m. is a familiar guide to pilots. Likewise the chief disadvantages are that (1) the pilot must always use the conversion to density altitude given on chart, (2) none of the limits for cruising operation within the normal operating altitudes are set by revolution limitations (with cruising propeller setting), (3) r.p.m. for constant power and cruising limits vary markedly with density altitude, (4) full throttle and low altitude manifold pressure cruising limits depend approximately on pressure altitude hence, where air temperature is other than standard, they do not use the same vertical position on the chart.

Items (1-3) listed above are of special interest since earlier usage of constant r.p.m. as a cruising guide is now recognized as wholly inadequate and possibly injurious to the engine. The maximum permissible r.p.m. at standard temperature varies with altitude as follows: rising along a constant manifold pressure line from 1,510 at sea level to 1,660 at 4,000 ft., then rising along a constant power line to 1,850 r.p.m. at the limiting value of 14,000 ft. (full throttle) from where it decreases along the full throttle line as altitude is further increased. These limits change with temperature variation as reference to Fig. 26 will show. Thus if the air temperature is high the cruising limit remains at 1,850 r.p.m. for density altitudes above 14,000 ft. up to the point at which 1,850 r.p.m. is no longer obtainable.

Density altitude correction

The use of Fig. 26 is relatively direct and should cause little difficulty once the underlying principles are fully appreciated. In order to cruise at a given desired velocity or at a certain percentage of rated engine power it is first necessary to find the correct density altitude position by means of the conversion scale at the left. From the existing atmospheric temperature on the temperature scale a line is run vertically to the pressure altitude given by the diagonal lines. The ordinate position thus established represents the density altitude. The desired values of per cent power and r.p.m. for any velocity, or vice versa, are obtained along the horizontal line from this established density altitude. An alternate method of obtaining the density altitude is that of starting at the given pressure altitude along the standard temperature line and moving along the diagonal lines to a position directly above the existing atmospheric temperature; this intersection likewise locates the density altitude. An illustrative example is worked out on Fig. 26. The temperature correction of the altimeter itself has been neglected in these charts because for normal operating temperatures the instrument reads pressure altitude correctly well within necessary precision.

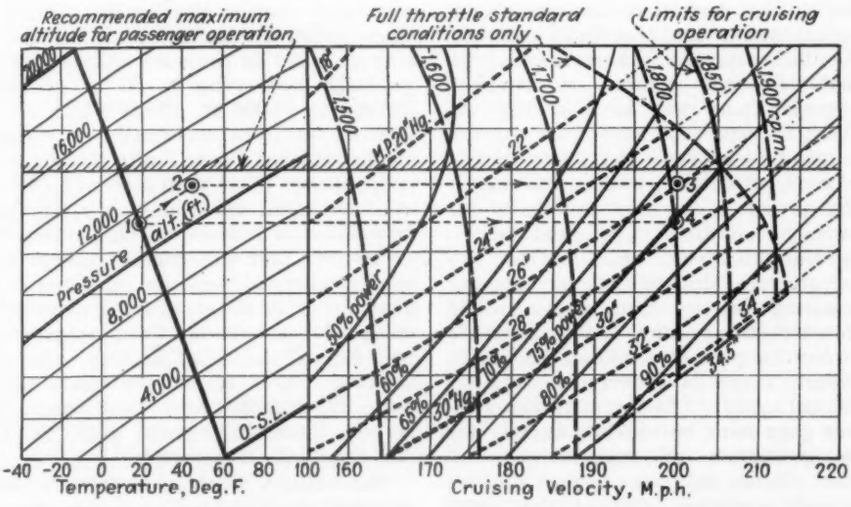


Fig. 28: Combination cruising chart showing velocity *vs.* altitude for various constant values of the engine characteristics: percentage of rated power, revolutions, and intake manifold pressure. Density altitude conversion scale is used with engine power and revolutions, but simple pressure altitude scale is used with manifold pressure and full-throttle line. (Douglas DC-2 Propellers set in high pitch at 34.5 deg. at 42 in. radius; diameter 11.0 ft.)

Example: At 11,500 ft. pressure altitude, temperature of 45 deg. F. and 200 m.p.h., there is determined as shown (from point 3): Per cent of rated power, 72.0; Engine revolutions, 1,805 r.p.m.; From point (4) intake manifold pressure, 27.4 in. Hg.

The simple pressure altitude scale must be used for obtaining the approximate limiting velocities where full throttle and manifold pressure limits hold. The pressure altitude ordinate is obtained by locating the existing pressure along the standard temperature line, no correction being made for temperature. The height on the ordinate scale is that desired for determining manifold pressure and full throttle functions. The velocity for the manifold pressure limit is then obtained by following along the horizontal line through the pressure altitude point.

An alternate form of simplified cruising chart is shown in Fig. 27. On this curve there is plotted velocity versus altitude for various constant values of engine power and manifold pressure. Manifold pressure is here used as the guide for the control of cruising, whereas r.p.m. was used in Fig. 26. There is some justification for the use of manifold pressure if only one guide is used, especially where cruising is carried out at or near the limits for cruising operation. The chief advantages of this type of chart are that (1) the pressure altitude scale is used for obtaining velocity from any manifold pressure (this relation is approximately correct for present airplanes, but might require a special conversion scale for unusual cases), (2) the manifold pressure gage must be watched anyway for the protection of supercharged engines, hence only one gage is used for all operation, (3) at the limits for cruising operation, the manifold pressure varies little for altitudes up to the full throttle altitude. The main disadvantages are that (1) engine power is found through the density altitude conversion scale while the simple pressure altitude is used with manifold pressure, thus the two characteristics are obtained at different vertical locations on the chart, (2) the percentage power, hence velocity, may vary for the same manifold pressure reading when the mechanical condition of the engine varies, (3) the use of the pressure altitude scale alone is only approximate, and does not necessarily hold for all airplanes and engines.

The use of the manifold pressure gage as a guide to cruising operation is particularly favorable to the pilot because the velocity is defined directly by instruments in the cockpit, the altimeter and manifold pressure gage. No correction for temperature is needed. Furthermore the manifold pressure limits for cruising operation are independent of temperature and change little with altitude. These limits are simply: 30 in. of mercury to 4,000 ft. pressure altitude, then gradually decreasing to 26 in. at full throttle at 14,000 ft., above which altitude the pressure necessarily decreases rather rapidly. These limits change for temperatures other than standard, however for usual conditions they can be memorized in a moment. Only when it is assured that the engine is kept in good mechanical condition, and that engine power is of secondary importance except for maximum limiting power, will Fig. 27 be a satisfactory type of cruising chart. It may be noted that more difficulty has been experienced in keeping manifold pressure gages accurate than with tachometers.

The velocity is obtained from intake manifold pressure, and vice versa, from Fig. 27 by locating the pressure altitude along the standard temperature line, thence moving horizontally into the main chart. The power, however, is obtained as before from the density altitude, which requires in addition that air temperature be utilized to determine the ordinate.

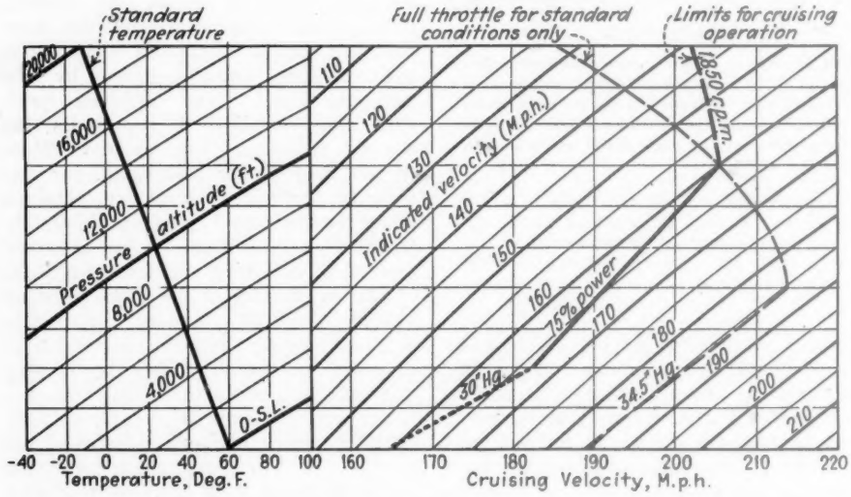


Fig. 29: Cruising chart and general velocity determination chart showing velocity versus altitude for various indicated velocity readings of the airspeed meter. Density altitude conversion scale is used as ordinate. Douglas Transport DC-2.

Since the low altitude cruising limit is one of manifold pressure and the high altitude limit is the full throttle condition, the pressure altitude scale is used for these cases. For the power limit at intermediate altitudes the density altitude scale is used for power, while simultaneously, manifold pressure is obtained at the same velocity abscissa from the direct pressure altitude scale. An example illustrating the use of this chart is worked out on Fig. 27.

Complete chart recommended

After pilots have had sufficient experience in cruising under the guidance of charts of these types, or whenever their use is well enough understood to avoid possible confusion, it is recommended that the complete chart be adopted rather than one of the simplified types. The complete chart as shown in Fig. 28 gives the variation of velocity with altitude for constant values of engine power, r.p.m., and intake manifold pressure. The advantages of both the simplified charts can be combined and the disadvantages largely eliminated. The pilot can choose either manifold pressure or r.p.m. as the guide to cruising flight. It is possible also to check the cruising conditions and detect improper and unusual performance of the engine. In short, all essential engine data are available on Fig. 28; so that the pilot himself can choose which portions to use and which to ignore.

The density altitude is used with the engine power and r.p.m. lines, while pressure altitude is used with manifold pressure and full throttle lines (usually a sufficiently close approximation). The process has been fully described in earlier paragraphs. The illustrative example previously carried out in Figs. 26 and 27 is again included in Fig. 28.

The main point of caution in cruising operation is the fact that no constant value of r.p.m., manifold pressure, or other available guide will achieve the desired cruising efficiency throughout for all altitudes and atmospheric conditions. Cruising at any percentage of power or at any velocity, and at maximum limiting values where engine characteristics are used for control requires that the proper value of manifold pressure or r.p.m. be employed for each particular altitude and air temperature.

A second point which has been previously dealt with and illustrated in Fig. 1 of this series of articles, (AVIATION, April 1934) is the fact that indicated velocity becomes increasingly lower than the true airspeed as density altitude increases. The indicated velocity reading will of course not correspond to values of true velocity on the abscissa scale in the charts. Only when fully corrected for instrument calibration and air density is the true velocity derived. Even though this fact is generally appreciated, there seems to be a persistent, probably involuntary, tendency to infer

a false sense of speed in proportion to the indicator reading. True velocity, in the same way as engine power, must be regarded as not directly obtainable from instruments in the cockpit, but it must be regulated indirectly by the control of available engine characteristics or indicated airspeed, and the cruising chart. A direct reading, true airspeed, indicator would do more toward the appreciation of modern cruising technique than volumes of written text.

True air speed indicator needed

Until such an instrument is available, however, the best solution to the problem of obtaining actual cruising speed appears to be found in a chart as shown in Fig. 29. The curves of constant indicated velocity are obtained from the airspeed meter calibration and the relation that the true velocity at any altitude varies inversely as the square root of the relative density. The density altitude conversion chart is again used, since density altitude is desired for the ordinate. The explicit manner in which there is shown the variation of true velocity with altitude for constant indicated velocity is of particular value in clearing up the sense of uncertainty regarding actual speed at the higher altitudes. While the limits given on Fig. 29 apply only in level cruising flight, the main chart can be used quite generally in determining the velocity for any type of flight.

Indicated speed a guide

It becomes immediately apparent that the indicated velocity can be used as a guide to cruising control. Indicated velocity is one of four dependent variables, of which three are directly available to the pilot; r.p.m. intake manifold pressure, and indicated velocity. The fourth, engine power, is of primary importance, but is controlled by regulation of the other three.

A cruising chart in which indicated velocity is used as the guide in piloting is plotted in Fig. 30. Percentage of rated engine power as well as the necessary cruising limits are included. In many respects the indicated velocity is most desirable as a guide to cruising control.

Cruising regulation by indicated velocity has the same main advantages and disadvantages as regulation by r.p.m., and suffers neither of the disadvantages of cruising by intake manifold pressure control. In fact, it gains one advantage, that the indicated velocity varies little for the allowable cruising limits. Other special advantages of the use of indicated velocity are that (1) actual measure of true velocity is obtained (2) the instrument is always calibrated for any airplane with serious purpose. Special disadvantages are principally that (1) instrument calibration is subject to change due to careless handling of pitot tube and pressure lines, etc. (2) engine instruments must be periodically watched beside the airspeed indicator.

The use of Fig. 30 is quite the same as explained earlier for Fig. 26, since the density altitude scale is used again throughout, except for the cruising limits, which make use of the simple pressure altitude. An example of the use of indicated velocity for control of cruising is carried out in Fig. 30.

It has been demonstrated in practice that the pilot can regulate his cruising flight in the desired manner by use of one of the types of cruising control charts that has been presented in this article. Further special combinations might be more suitable to certain types of operation; however, simplification is generally recommended in the interest of conscientious and correct control.

The study of the problem of piloting control brings to light the urgent need for two new direct reading instruments, (1) density altitude indicator, (2) true velocity indicator. The density altitude indicator would dispose of the conversion scale as ordinate while the true velocity indicator would eliminate the necessity of any curves other than those for per cent power and cruising limits. It is sufficient to refer to Fig. 31 as the cruising chart that would be used with these instruments. Note that the limits dependent upon pressure altitude have been spread so that density altitude is used throughout.

The type of cruising control described herein applies to the level flight portion of cruising operation. The effect of climbing to cruising altitude and gliding down therefrom must be considered for establishing desired control of the entire operation. These problems will be considered in succeeding articles.

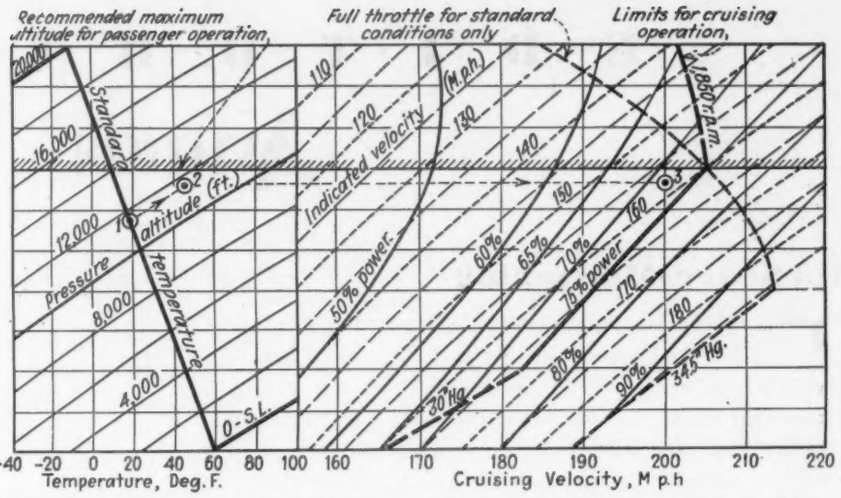


Fig. 30: Control of cruising by indicated velocity. Chart shows velocity and percentage of rated engine power for any altitude and atmospheric temperature as a function of indicated velocity. Density altitude conversion scale is used with engine power and indicated velocity, but simple pressure altitude scale is used with manifold pressure and full throttle line. (Douglas DC-2.) Propellers set in high pitch at 34.5 deg. at 42 in. radius; diameter 11.0 ft.

Example: At 11,500 ft. pressure altitude and 45 deg. F. temperature, point (3) located by use of the density altitude conversion scale gives, at 200 m.p.h.: Per cent of rated engine power, 72; Indicated velocity, 157.5 m.p.h.

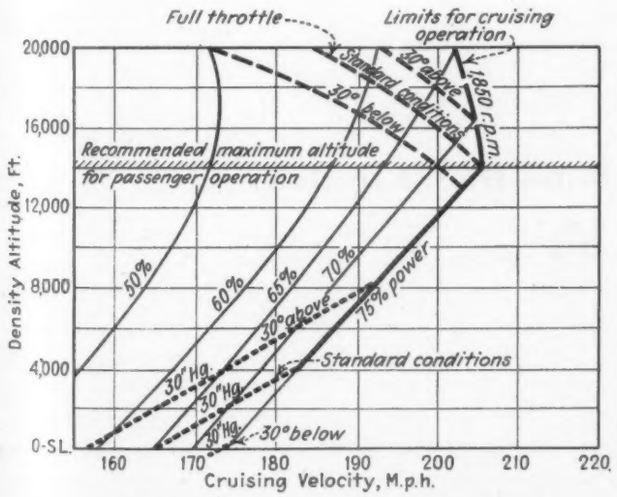


Fig. 31: Control of cruising by use of true velocity and density altitude. This chart illustrates the simplification and explicitness possible when direct reading density altitude and true velocity instruments become available. Limits depending upon pressure altitude are plotted for plus or minus 30 deg. F. difference from standard temperature so that the density altitude scale can be used entirely. (Douglas Transport DC-2.)

EDITORIALS

AVIATION

On Scare-Mongering

THE DUST has long since settled, and the big stands in Cleveland are again deserted, but quite a few thousands of citizens will carry with them for a long time vivid impressions of what they saw and heard at the National Air Races. Much of what they saw was good; some was of questionable value. Some things that they heard were decidedly bad. It seems a bit silly to get 60,000 people together and then fill them with erroneous ideas about this aviation business. Instead of jittering a lot of nonsense through loudspeakers about the dangers of staged landing gear accidents or deliberate engine stoppages, it might be more to the point to develop the idea that such events are very rare indeed in ordinary commercial flying, and that, in the remote cases where they might occur, a competent pilot can carry them off without danger to his passengers. It may be perfectly legitimate to throw a few thrills into the program in the form of acrobatics, or a certain amount of closed course racing (few people have ever given up driving their automobiles on the roads because they happened to see a race driver wrecked on the Indianapolis track), but if confirmation is given to a wide-spread impression that it is quite the ordinary thing for airplanes to come apart in the air, or that an engine failure is inevitably fatal, then the public will have every right to be suspicious of the airplane as a means of transportation. The encouraging turn-out at Cleveland this year will undoubtedly engender plans for bigger and better air shows in the future, but let us be careful to avoid any sort of ballyhoo that puts all flying in the light of a tricky and dangerous sport. Advertise it first of all as a practical and useful means of transportation.

The Industry and the Blue Eagle

THE CODE of fair competition for the commercial aviation industry has been approved, a document substantially transformed since the hearings of July 10. In the process of revision much of the effectiveness of the earlier form has disappeared.

The curse of delayed action threatens the established procedure for price determination by the Administrator in the event of any emergency arising in competitive relations of members. There is scant protection for an established operator whose income is threatened by an irresponsible competitor who sets himself up in business on an adjacent field with a prehistoric airplane, an unduly large share of high pressure sales ability, and a schedule of prices that always makes it necessary to hold up payments to the gasoline man until next week. Such an operator might have no difficulty in skimming most of the cream from the traffic peak between Fourth of July and Labor Day and by the time it was possible to crack down on him he would retire gracefully and leave the fall slump to the fellow who had to live with the job the whole year around.

Uniform methods of cost finding and accounting may be formulated at the discretion of the National Code Authority but there is no definite guarantee that an attempt will be made to help the smaller operator learn how much it really costs him to run his business. It would be admittedly unfair to impose a standard form of cost accounting on every member of such a highly diversified industry, as advocated in the proposed code, but the duty of devising a standardized accounting system to be used as a yardstick by which a man could measure his own business, might have been delegated definitely to some agency, preferably the regional code authorities, without endangering the position of any farseeing member of the industry.

There are many other points of weakness in the code as it now stands. Much of the responsibility for the formulation of satisfactory principles of conduct for the individual members of the industry is left to the initiative of the Code Authorities, National and regional. It is hoped that these bodies will take early action toward filling the several gaps that must be bridged before the industry will receive the full benefits that it should enjoy under the NRA.

John Doe, Esquire

WE HAVE ALL HEARD a lot about a mysterious individual called the Private Owner. It is a bit difficult, however, to catch up with him—or, at least, with enough of him at once—to get much of an idea of what he looks like, how he lives, and why, of all things, he has become the proud possessor of an airplane. It is extraordinarily difficult to get a satisfactory composite photograph of him. Invariably, when the plates are developed, the face bears a startling resemblance to our old friend, John Doe.

To each manufacturer of aircraft, John is a different person. To the man who builds $50,000 playthings for the stables of the rich he is one thing. To the man whose light planes chug about airports on pleasant afternoons, he is another. How he looks to one manu-

facturer is told elsewhere in this issue. To him, John Doe is a "go-getter,"—a man who, in the midst of an active business career, makes use of the means at his disposal to get from city to city with the least possible effort in the shortest possible time. In off moments he likes to drop in at country clubs from Maine to Florida, to run up into Canada to shoot or fish, or to take his family on transcontinental sight-seeing trips.

Most important of all, Mr. Doe (of whatever category) is a progressive person. He flies his plane further in the first few months of ownership than he did in a whole year back in 1930. He now demands a comfortable ship, one that is safe and easy to fly,—one that will not "eat its head off" in gasoline and oil and that can be maintained at a reasonable cost. He wants to fly it himself. He wants his wife to fly it, too. He buys radio and adaquate instruments for his ship, and casually flies cross-country in weather that would have kept him in the hangar a few years ago. By and large, he is the sort of fellow this industry needs. In the words of the Prophet,—"may his tribe increase."

The Navy Receives Callers

ON A RAINY MORNING in September 300 representatives of the industry and the Federal Government went out to sea aboard the aircraft carriers Lexington and Saratoga to witness an all day demonstration of Naval Air tactics in maneuvers off Virginia Capes. A large proportion of the Navy's guests on this occasion were civilians directly or indirectly engaged in the manufacture of aeronautical equipment and supplies,—visitors who knew from their interpretation of blueprints and specifications how their products were supposed to work, knew vaguely how airplanes landed and took off in carrier operation, but had never seen it done. Questions were asked and answered freely and everyone left with a feeling of enlightenment and a new appreciation of the problems inherent in the operation of the elusive and compact floating airports of the Fleet. Never before had such a large group of civilians been afforded the privilege of witnessing carrier operations at first hand.

Even the weather, consistently bad throughout the day, was an asset as it impressed the Navy's guests with the fact that the carriers are not fair weather ships and their missions may be performed accurately and effectively under the handicaps of slippery decks and poor visibility.

In these columns we have urged with frequency bordering on monotony that a greater spirit of cooperation be brought about between the mutually dependent units of the military and naval services and the aviation industry with its many ramifications. The exercises last month were a definite and important step in that direction. It is hoped that this gathering will be the first of a series of annual events and that means will be found to accommodate even larger numbers of guests.

Efficiency with Simplicity?

IN WANDERING ABOUT in airplane factories, especially those shops which have swung over to the all-metal technique on a large scale, one is first impressed by the real beauty and obvious strength of the final product, but appalled by the number and complexity of the component parts. Hundreds of thousands of rivets; thousands of clips, gusset plates, straps; hundreds of stringers, stiffeners and braces; dozens upon dozens of beams, girders, formers and skin plates, etc., etc. *ad infinitum,* go into the average metal fuselage or large hull of today. The desire to approach perfect aerodynamic and hydrodynamic forms makes it possible to duplicate but relatively few of this extraordinarily large number of parts. The constant search for high strength with minimum weight makes an individual problem of each joint, fitting or sub-assembly, with each element proportioned to carry its load most efficiently, a procedure that again leads directly away from simplification and standardization.

Perfection in shape and maximum efficiency in the use of materials are both highly commendable objectives. Some of the mental and physical gymnastics involved in attaining them, however, are astounding. We saw recently a section of deck plating for a boat hull in which double curvatures and a hatch opening introduced such complications that a satisfactory layout had been achieved only after several weeks of calculation by a group of engineers. In another plant, the chief engineer exhibited a main bulkhead, a beautiful job of design and workmanship, on which four men had already labored for over three weeks, still to be completed. He pointed out a few of the complications —clips for stringers formed individually to match the exact curvature of hull lines—plates and stiffeners intersecting at odd angles to take the thrust of external loads most efficiently—thousands of rivets, many in places difficult of access.

We are filled with admiration for the engineering brain-work and the hand-worker's skill that go into such structures. We are also heartily in accord with the sort of progress that explores every possible approach to weight saving and efficiency, but we are beginning to wonder if, after all, designers have not overlooked some of the virtues of simplicity in their search for perfection. During development stages the efficiency-at-any-cost idea is perfectly sound, but once the objective has been reached, the problem should resolve itself into a search for every possible means of design simplification without losing any of the ground already attained. We have nothing specific to suggest here as to ways and means, but we would urge that every designer, engineer, builder, go through his product with an eye toward dollar saving through structural simplicity as carefully as he is wont to check for weight saving through structural efficiency. The pages of AVIATION are always open to those who have something to contribute to this important subject.

NEWS OF THE MONTH

★ FEDERAL AVIATION COMMISSION . . . Hearings opened Sept. 24.

★ SERVICES . . . Secretary Dern supports Foulois . . . War Department assigns more Air Corps officers to General Staff . . . Navy Department approves 500 plane construction program.

★ AIR MAIL AND TRANSPORT . . . Airlines buy new equipment . . . Traffic figures for half year show increase . . . Twelve schedules added to domestic mail system . . . Hawaiian mail contract awarded.

★ NATIONAL AIR RACES . . . Table of results.

★ NOTABLE FLIGHTS . . . Two North Atlantic crossings.

★ MANUFACTURERS . . . Glenn L. Martin plans refinancing . . . Waco reports profit . . . Fleetwings expands.

F.A.C. starts hearings

THE Federal Aviation Commission, appointed by President Roosevelt to formulate a permanent air development program for the United States, opened formal hearings Sept. 24. Leaders in the industry both in the military and the civil field will appear before it. First to be heard will be representatives of government agencies concerned with civil aviation, followed by private organizations and individuals who have constructive suggestions pertinent to a national air policy. Much valuable information has been assembled by the commission during its recent survey of leading air transportation systems and air centers in this country and in Europe. Four members of the board, Vice-Chairman Edward P. Warner, Franklin K. Lane, Jr., Jerome C. Hunsaker, and Albert J. Berres, recently made a 13,000-mile inspection tour of the United States, Panama, and Central America. At the same time Chairman Clark Howell was investigating conditions in England, France, Italy and Spain.

It is expected that the hearings will continue for at least a month and that the commission will then devote two months to the task of assimilating the material collected in an effort to treat every phase of the subject exhaustively. Its final report and recommendations for legislation will be submitted to the new Congress before Feb. 1.

Foulois stays

Last June the House Military Affairs subcommittee investigating aircraft purchases submitted to Secretary Dern its report unanimously recommending that Major General Foulois be removed as chief of the Air Corps. Following the usual military procedure, Secretary Dern sent the report and recommendation to General Foulois for any answer he might desire to make. Last month Secretary Dern forwarded to the committee Foulois' reply in which the General stated that he would be unable to answer the charges against him until the committee gives him access to the testimony on which the demands were based. This, he said, the committee had failed to do in spite of repeated requests from him. With the Foulois statement, Secretary Dern sent a letter of his own asserting that constitutional rights had been denied Foulois in that he had not been permitted to submit rebuttal evidence, was not represented by counsel at the hearings, and had been unable to obtain the committee's records. At this point the affair rests temporarily, pending the reconvening of the subcommittee.

Nye committee

The Senate committee headed by Gerald P. Nye, investigating the activities of munitions makers, opened hearings late in August. Among other matters on which testimony was heard was the question of selling military aeronautical equipment abroad. Verbal and documentary evidence as to negotiations for the sale of planes to South America, Mexico, Germany, and China was read into the record. A full report of its findings will be made by the committee when Congress reconvenes.

Greater voice for Air Corps

Acting on the recommendation of the Baker Board, the War Department decided to detail four additional Air Corps officers to serve on the Army's General Staff. The new members, who will be chosen from the sixteen officers now eligible for General Staff assignment, will raise the total number of Air Corps representatives on the General Staff to nine. The purpose of the larger voice for the Air Corps is to bring about a fuller understanding in the General Staff of the air service and its needs in procurement and training.

Approving the Baker Board report, President Roosevelt authorized the Air Corps to prepare a budget calling for the purchase of 700 to 800 new planes each year until a quota of 2,300 first class aircraft is obtained. The Baker Board reported that the Army was 1,000 planes short of the number needed for adequate defense. The proposed purchases provide for replacement of 300 to 400 planes which either wear out or become obsolete each year. The Air Corps now has 1,300 to 1,400 serviceable planes. Assistant Secretary of War Woodring has advertised for bids for 1934 and 1935 airplane purchases and the General Staff is now considering the proposed 1936 procurement program.

War Department plans for a GHQ air force, as endorsed by the Baker Board and by the President, would give the Chief of Staff and the General Staff almost absolute control over the Air Corps as an integral part of the U. S. war machine. Though temporarily defeated, proponents of the unified air force, which would coordinate all governmental aeronautical activities, will submit their plan to the Federal Aviation Commission for consideration.

Navy building approved

A construction program of about 500 planes for the fiscal year 1936 was approved by the Navy Department and submitted to the Budget Bureau. Half of these will be used to replace obsolescent equipment, while the other half will be new planes in accordance with the terms of the Vinson Bill, authorizing the construction of as many planes as are needed to equip a Navy built up to full treaty strength. Included in the estimate are 108 ships for each of the new aircraft carriers the Enterprise and Yorktown, now on the ways. The airplane complement of each carrier is to be eighteen each of attack, scouting, dive bombers, torpedo planes.

In addition, 36 spare planes will be provided for each carrier. Estimates for the spares will be included in the budget now being drawn. Another carrier, a 14,500-ton vessel to replace the Langley, is included in the shipbuilding program recommended by the Navy's general board for fiscal year 1936. At the end of the current fiscal year the naval air service will have 1,195 planes, some of which are being constructed with PWA funds and others with regular Navy appropriations.

Navy maneuvers

Three hundred guests including representatives of the industry and of the Federal Government, as well as of the Army and the Navy accepted the invitation of the Navy Department to witness an aerial review off Virginia Capes from the Aircraft Carriers Saratoga and Lexington, Sept. 6. Although such demonstrations have been attended by small delegations from the industry in the past, this is the first time that such a large number of civilians has had a first-hand opportunity to see carrier operation at short range.

Some 30 naval vessels including battleships, heavy and light cruisers, plane guard destroyers and more than 240 airplanes participated. Exercises involved launching and recovery of airplanes from the carriers, catapult launching of seaplanes from the battleships, simulated dive bombing attacks, formation flying and anti-submarine operations. Aboard the Flagship Saratoga, Admiral William H. Standley, Chief of Naval Operations, was host to members of the Federal Aviation Commission, officers of the National Aeronautic Association and others.

TWA to Supreme Court

Transcontinental & Western Air carried its fight against the cancellation of air mail contracts by Postmaster General Farley last February to the Supreme Court Sept. 11. The company applied for a review of the Second Circuit Court of Appeals ruling which upheld dismissal of the airline's action on the grounds that the court had no authority to restrain the Postmaster General from the cancellation (see AVIATION, July, page 222). The Supreme Court has not yet handed down a decision.

Calendar

Oct. 11-13—Annual meeting, National Aeronautic Association, Washington, D. C.

Oct. 20 — MacRobertson International Air Race, London to Australia.

Nov. 16-Dec. 2 — Exposition Internationale de L'Aeronautique, Grand Palais, Paris, France.

New planes for airlines

New Vultee transports placed in service Sept. 9 on American Airlines route from Chicago to Fort Worth cover the distance of 959 miles in six hours, 27 minutes. Four of these high-speed low-wing monoplanes powered with Wright Cyclones and carrying eight passengers and two pilots, have already been delivered and six more are on order. Three are assigned to the long southwestern run while the other is in service between Cincinnati and Chicago. On a test flight between Chicago and New York, one of the new Vultees averaged more than 241 m.p.h., took only two hours, 59 minutes, two seconds for the trip. The best previous time between the two cities, three hours, ten minutes, was made by Captain James Haizlip in a racing plane.

Six Douglas transports were recently delivered to Pan American Airways System for South American service. Three of the new planes will fly Panagra's West Coast run from Panama to Santiago and across the Andes to Buenos Aires and Montevideo. The other three will be used on Pan American's East Coast service.

The new Sikorsky S-42 flying boat, recently christened Brazilian Clipper, will be put into regular service Nov. 30 when at least one of her two sister ships will have been completed. At that time a five-day schedule from Miami to Rio de Janeiro will replace the present seven-day run.

Another Douglas order comes from General Air Lines. Four of the new transports will go into service between San Diego and Salt Lake City Oct. 15. Present flying time of six hours, 45 minutes will be cut to three hours, 55 minutes. The four planes and four spare 710 hp. Wright Cyclones will cost $326,820.

The Royal Dutch Air Lines are working out plans for an air line from the Netherlands to the Island of Curacao in Dutch Guiana. The possibility of a tie-up with Pan American's South American service at this point is being discussed. K.L.M.'s equipment has long been powered with American engines, fitted with American instruments. Recently they took delivery on a 14-passenger Douglas transport, which will be an entry in the forthcoming MacRobertson race. K.L.M.'s participation in the race will precede the establishment of a five-day service between Amsterdam and Batavia.

More mail trips

Additional air mail schedules on twelve routes were authorized by Postmaster General Farley Sept. 20. One round trip daily will be added on the following routes: Chicago-Cheyenne, Kansas City-Los Angeles, New York-New Orleans, New York-Detroit, Chicago-Jacksonville, Portland, Ore.-San Francisco, Washington, D. C.-Cleveland, New York-Boston, Cleveland-Nashville, Nashville-Fort Worth, Omaha-Kansas City, Chicago-St. Louis. Five cities now without air mail service will be provided with it by the new schedules. They are Providence, New Haven, Elmira, Scranton, and Youngstown. The annual cost of the additional service amounts to $1,332,938, raising the total annual cost of domestic air mail service to $8,943,562. Total annual mileage flown will be increased 5,479,144 miles, to 33,286,081 miles.

NORTHROP EXPANDS

In order to take care of increasing business Northrop Corporation of Inglewood, Cal., recently moved into a new plant, trebling its floor space. Approximately 1,000 men are now employed by the company.

A contract for carrying air mail on the Hawaiian Islands was awarded to the Inter-Island Airways, Ltd., of Honolulu by the Post Office Department. The rate of pay for the service, linking the four large islands of the group and covering a distance of approximately 333 miles, is 19½ cents per airplane-mile. Inter-Island Airways, a subsidiary of Inter-Island Steam Navigation Company, has operated a passenger and express service in Hawaii for several years. Sikorsky twin-motor eight passenger amphibions are used. President and general manager of the company is S. C. Kennedy.

Bureau traffic report

According to statistics compiled by the Bureau of Air Commerce, 241,772 passengers were carried in the first half

RESULTS OF THE NATIONAL AIR RACES AT CLEVELAND

Event Number and Class	Place	Pilot	Plane	Engine	Displacement	Time	Speed	Purse
STRAIGHTAWAY DASHES								
Bendix Transcontinental	1	Doug Davis	Wedell-Williams Racer	Wasp	985	9:26:41	216.237	$4,500
	2	J. A. Worthen	Wedell-Williams Racer	Wasp	1,344	10:03:00	203.213	2,500
	....[1]	Lee Gehlbach	Granville, Miller, DeLackner	Hornet	1,690	.....	.....	.....
No. 2—Shell—375 cu.in	.....	Lee Miles	Miles-Atwood Special	Menasco	363	.....	227.947	1,000
No. 6—Shell—550 cu.in	.....	Harold Neuman	Howard Racer	Menasco	489	.....	222.859	[2]150
No. 10—Shell—unlimited	.....	J. A. Worthen	Wedell-Williams Racer	Wasp	1,344	.....	302.036	.....
No. 13—Shell—unlimited	.....	Doug Davis	Wedell-Williams Racer	Wasp	1,344	.....	264.794	[2]250
No. 14—Thompson Trophy Race	1	Roscoe Turner	Modified Wedell-Williams Special	Hornet	1,690	24:10:36	248.129	4,500
	2	Roy T. Minor	Brown Special	Menasco	544	27:54:58	214.929	2,500
	3	J. A. Worthen	Wedell-Williams Special	Wasp	985	28:47:65	208.276	1,500
	4	Harold Neuman	Howard Racer	Menasco	489	28:58:59	207.064	1,000
	5	Roger Don Rae	Keith-Ryder	Menasco	544	29:13:04	205.358	500
	.....	Art Chester	Chester Special	Menasco	363	31:18:94	191.597	.....
	....[3]	Doug Davis	Wedell-Williams Racer	Wasp	985	.....	.....	.....
	....[4]	Lee Miles	Miles-Atwood Special	Menasco	363	.....	.....	.....
Shell Qualification, Group 1	1	Lee Miles	Miles-Atwood Special	Menasco	363	.....	233.44	350
	2	Art Chester	Chester Special	Menasco	363	.....	229.715	250
	3	Earl Ortman	Keith-Ryder	Menasco	363	.....	201.865	150
	4	S. J. Wittman	Wittman Special	Hermes Cirrus	349	.....	201.08	100
	5	Joe Jacobson	Howard Racer	Wright Gypsy	318	.....	172.21	50
Shell Qualification, Group 2	1	Roy Minor	Brown Special	Menasco	544	.....	243.145	525
	2	Harold Neuman	Howard Racer	Menasco	489	.....	239.623	375
	3	Roger Don Rae	Keith-Ryder	Menasco	544	.....	235.336	225
	4	Lee Miles	Miles-Atwood Special	Menasco	363	.....	233.44	150
	5	Art Chester	Chester Special	Menasco	363	.....	229.715	75
Shell Qualification, Group 3	1	Doug Davis	Wedell-Williams Racer	Wasp	1,344	.....	306.215	875
	2	Roscoe Turner	Wedell-Williams Racer	Hornet	1,690	.....	295.465	625
	3	J. A. Worthen	Wedell-Williams Racer	Wasp	985	.....	292.141	375
	4	J. A. Worthen	Wedell-Williams Racer	Wasp	985	.....	248.913	250
	5	Roy Minor	Brown Special	Menasco	544	.....	243.145	125
CLOSED COURSES								
No. 1—375 cu.in	1	Lee Miles	Miles-Atwood Special	Menasco	363	14:52:11	201.767	630
	2	Art Chester	Chester Special	Menasco	363	14:55:40	201.027	350
	3	Earl Ortman	Keith-Ryder	Menasco	363	18:51:62	159.063	210
	4	Joe Jacobson	Howard Racer	Wright Gypsy	318	19:02:55	157.542	140
	5	S. J. Wittman	Wittman Special	Hermes Cirrus	349	19:06:73	156.968	70
No. 3—550 cu.in	1	Lee Miles	Miles-Atwood Special	Menasco	363	8:43:66	206.241	765
	2	Roger Don Rae	Keith-Ryder	Menasco	544	8:47:36	204.770	425
	3	Arthur Chester	Chester Special	Menasco	363	8:51:02	203.382	255
	4	Harold Neuman	Howard Racer	Menasco	489	9:20:11	192.819	170
	5	Roy Hunt	Howard Racer	Menasco	489	9:55:66	181.311	85
No. 4—200 cu.in	1	S. J. Wittman	Pobjoy Special	Pobjoy	173	6:57:18	129.440	180
	2	Willis Kysor	Rasmussen Special	Rasmussen	190	7:59:90	112.523	100
	3	Art Davis	Houser Special	Continental	115	8:06:73	110.944	60
	4	Clarence McArthur	Tillbury Flash	Church	108	8:46:18	102.626	40
No. 5—375 cu.in	1	Lee Miles	Miles-Atwood Special	Menasco	363	8:54:17	202.183	630
	2	Art Chester	Chester Special	Menasco	363	9:01:91	199.295	350
	3	S. J. Wittman	S. J. Wittman Special	Hermes Cirrus	349	9:38:77	186.603	210
	4	Earl Ortman	Keith-Ryder	Menasco	363	9:56:04	181.196	140
	5	Joe Jacobson	Howard Racer	Wright Gypsy	318	11:36:93	159.965	70
No. 7—550 cu.in	1	Harold Neuman	Howard Racer	Menasco	489	8:30:51	211.553	765
	2	Roger Don Rae	Keith-Ryder	Menasco	544	8:31:84	211.003	425
	3	Lee Miles	Miles-Atwood Special	Menasco	363	8:51:56	203.176	255
	4	Arthur Chester	Chester Special	Menasco	363	8:55:03	201.857	170
	5	S. J. Wittman	Wittman Special	Hermes Cirrus	349	9:44:74	184.697	85
No. 8—200 cu.in	1	S. J. Wittman	Pobjoy Special	Pobjoy	173	7:55:78	113.498	180
	2	Art Davis	Houser Special	Continental	115	8:03:83	111.588	100
	3	Willis Kysor	Rasmussen Special	Rasmussen	.....	10:35:43	84.982	60
	....[5]	Clarence McArthur	Tillbury Flash	Church	.....	.....	.....	.....
No. 9—550 cu.in	1	Roy Minor	Brown Special	Menasco	544	8:26:43	213.257	765
	2	Lee Miles	Miles-Atwood Special	Menasco	363	8:40:84	203.451	425
	3	Arthur Chester	Chester Special	Menasco	363	8:51:94	203.030	255
	4	S. J. Wittman	Wittman Special	Hermes Cirrus	349	9:59:04	180.288	170
	5	Roy Hunt	Howard Racer	Menasco	489	10:28:45	171.851	85
No. 11—1,000 cu.in	1	Doug Davis	Wedell-Williams Racer	Wasp	985	13:34:68	220.946	765
	2	Walter Wedell	Wedell-Williams Racer	Wasp	985	13:40:05	219.498	425
	3	Harold Neuman	Howard Racer	Menasco	489	14:48:72	202.538	255
	4	Roy Minor	Brown Special	Menasco	544	15:04:95	198.906	170
	5	Roger Don Rae	Keith-Ryder	Menasco	544	15:06:71	198.519	85
No. 12—375 cu.in	1	Lee Miles	Miles-Atwood Special	Menasco	363	9:00:67	199.752	630
	2	Arthur Chester	Chester Special	Menasco	363	9:05:14	198.114	350
	3	S. J. Wittman	Wittman Special	Hermes Cirrus	349	10:12:80	176.240	210
	4	Earl Ortman	Keith-Ryder	Menasco	363	11:19:12	159.029	140
	5	Joe Jacobson	Howard Racer	Wright Gypsy	318	11:35:22	155.347	70

[1]Did not finish within specified time limit. [2]Bonus prize. [3]Out on eighth lap. [4]Out on twelfth lap. [5]Out on second lap.

of 1934 by all American-operated airlines (domestic and foreign extensions). The increase of 6,633 passengers over the same period last year was due to the traffic gains of foreign extensions which overbalanced the decrease registered by domestic lines. Mileage flown by foreign extensions increased from 2,849,377 to 3,793,993 miles, while domestic mileage fell to 17,723,665 from 23,012,743. Express carried during the first six months of 1934 showed tremendous gains. The domestic poundage increased from 660,082 in 1933 to 916,063 lb. for the 1934 period. Foreign extensions carried 656,951 lb. from January through June, against 395,794 lb. last year.

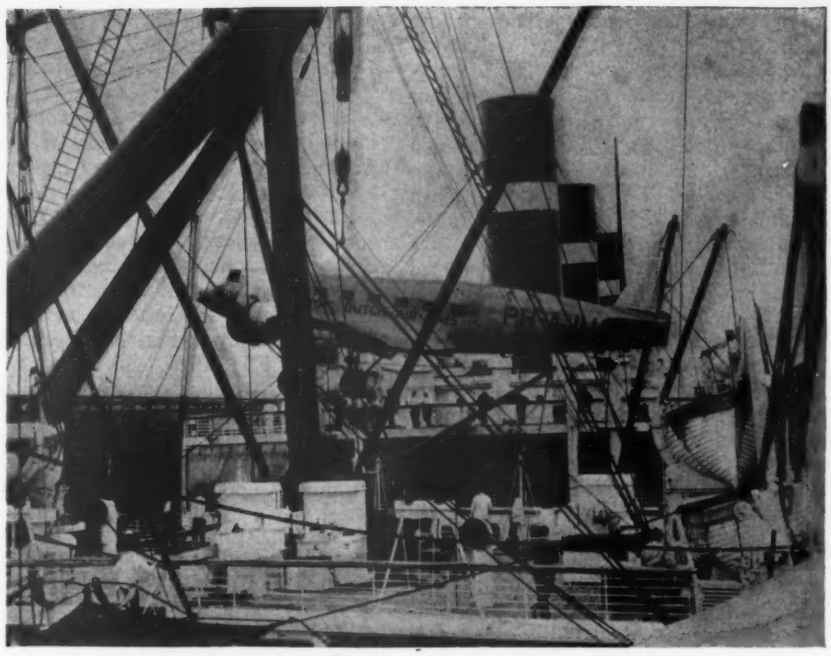
At Newark Airport there were considerable increases in the express poundage and passengers carried during the first six months of 1934 as compared to the same period last year. According to a report by Lieutenant Richard Aldworth, airport superintendent, passengers carried totaled 49,066 an increase of 9.8 per cent over the 1933 figure. Express was 319,286 lb. against 195,892 last year, a jump of 63 per cent.

Summer excursion rates over Eastern Air Lines New York-New Orleans route have met with such favorable response that the company extended them to Nov. 1. Traffic increased 80 per cent on this route after the 30-day round-trip excursions became effective last July.

Fares between Newark and Atlantic City were reduced to $7.50 one way and $12 round trip by New York Airways. The line also flies a 40-minute schedule to Atlantic City from Philadelphia.

Overnight service from St. Paul, Kansas City and other Midwestern points to Pacific Coast cities is now offered by United Air Lines by connections at Omaha with Hanford Air Lines, and Rapid Air Lines. A direct Los Angeles-Spokane service was recently inaugurated by United by means of new schedules between Spokane and Seattle. Passengers leaving Los Angeles at 8:50 a.m. reach Spokane at 6:35 p.m. United reports an increase of 30 per cent in its passenger traffic and 130 per cent in express shipments during the first eight months of this year over the corresponding period in 1933. Passengers totaling 98,772 were transported as against 76,028 during the same period of 1933.

All previous records for passenger traffic over its Eastern lines were broken during the month of August by American Airlines. Revenue passengers for the month total 4,231 at the Newark station alone, an increase of 27 per cent over July, while the Boston station had an increase of 25 per cent.



FLYING DUTCHMAN GOES TO SEA

First Douglas DC transport to be delivered to a foreign purchaser being loaded on the S.S. Statendam. Entered in the MacRobertson Race, the plane is destined to take up its duties on the K.L.M. Amsterdam-Batavia line this fall.

NAVY CONDORS

Two of the latest type Curtiss-Wright Condors are on the Navy's equipment roster for general executive transport. The Army also has two for the same purpose.

New hours for pilots

New regulations reducing maximum flying hours for first pilots on scheduled air lines were announced Sept. 4 by the Bureau of Air Commerce. The matter, though included in the discussion at the Safety Conference in Washington in August, was left open for further consideration at that time. The new regulations were agreed upon later at a conference of operators, pilots, the Aero Medical Association, and the Bureau of Air Commerce. Henceforth, pilots will be permitted to fly 1,000 hours per year, which averages about 83 hours per month. They may fly 100 hours per month during part of the year, but only for four consecutive months. Previously, maximum flying time for first pilots was set at 110 hours per month. The new regulations further require that each pilot have an examination every three months by an authorized Department of Commerce Medical examiner. In the past such examinations came at six-month intervals.

Dominion airport program

The Canadian transcontinental airway construction program inaugurated last year by the Department of National Defense with relief funds is now well advanced. One hundred and thirty airports are being built, supplemented by landing fields at points 25 to 30 miles apart along the 2,800-mile stretch be-

tween Canada's coasts. The prairie section is already fairly well completed and will be put in service early in 1935. Natural difficulties encountered in Northern Ontario (where the airway follows the Canadian National railroad), and in the section through the mountains of Alberta and British Columbia have retarded progress there. It is expected, however, that the entire coast-to-coast system will be completed within the next two years.

Atlantic flights

After a successful crossing of the North Atlantic via Greenland, Iceland, and the Faroe Islands Dr. Richard Light, professor of surgery at Yale University, and Robert Wilson of New Rochelle landed in Kirkland Bay, Orkney Islands, Sept. 6. Proceeding to England, they announced their intention of making a world tour in their Bellanca Skyrocket seaplane. The contemplated route will take them across India to the Philippines. At Manila they plan to take a steamship for California, finishing the trip with a flight across the continent to New Haven.

Greater difficulties with the North Atlantic crossing were experienced by John Grierson, British flier. Flying a Fox Moth with 130 hp. Gypsy motor he set out for Ottawa from Rochester, England, July 21. Delayed at Londonderry by exceptionally bad weather, he finally reached Iceland two days later and damaged his float gear and a wing in Reykjavik Harbor. After making the necessary repairs he resumed his flight Aug. 21 and, in spite of consistently poor flying conditions, arrived at Ottawa nine days later.

Industry reports

Shares of the three new companies formed by the reorganization of United Aircraft and Transport Corporation were admitted to trading on the New York Stock Exchange Sept. 5. The new companies are Boeing Airplane Company, United Air Lines Transport Corporation, United Aircraft Corporation. Stocks of United Aircraft and Transport Corporation had been listed since April 11, 1929.

In a registration statement filed with the Federal Trade Commission, the Glenn L. Martin Company proposes to issue certificates of deposit for its outstanding 6 per cent convertible gold notes, dated Nov. 1, 1929, which are to be called for deposit in the company's reorganization plan. The outstanding notes have a principal amount of $2,803,500 and a value for purposes of computing the registration fee of $934,500. Under the reorganization plan, these notes will be offered in exchange for the company's five-year 6 per cent convertible gold notes. The company is also seeking to register no-par common stock sufficient to provide for the conversion feature of the bonds.

For the six months ended June 30, 1934, Waco Aircraft Company reports net sales amounting to $544,705. After deduction of all costs the net profit for the period was $25,433.

Menasco Manufacturing Company of Los Angeles, recently incorporated, has issued 98,203 shares of stock out of an authorized 500,000 shares of $1 par value. Officers of the new corporation are A. S. Menasco, president; Charles F. McReynolds, vice-president; Reed H. Parkin, secretary and treasurer.

Waco aircraft are being produced and distributed in Canada by Jack Sanderson, Inc., of Fort Erie. Mr. Sanderson was formerly manager of Fleet Aircraft of Canada, and holds the exclusive manufacturing and selling rights for Waco in the Dominion.

Fleetwings, Inc., which recently combined their design patents for stainless steel airplane parts with the Edward G. Budd Manufacturing Company of Philadelphia, have purchased the plant of the Keystone Airplane Company at Bristol, Pa. The company will move from its present quarters at Roosevelt Field, Long Island, early in October.

Aviation People

• JACK FRYE, formerly vice-president in charge of operations, TWA, has been elected general manager and active head of the company. He replaces RICHARD W. ROBBINS who continues as president of Transcontinental & Western Air. Mr. Frey will divide his time between the Kansas City base and the New York office.

• HENRY EICHHAMMER, in charge of advertising and sales for Fairchild Aviation Corporation at Woodside, Long Island, has moved to new headquarters at the company's plant at Hagerstown.

• HENRY B. TATE of London and MRS. TATE, who is a Member of Parliament and actively interested in aviation, are making a tour of the United States on commercial airlines. Mr. and Mrs. Tate are including visits to aircraft factories in their itinerary and plan to make a study of American methods of operation and production.

• New manager of the aviation department of the National Aid Life Association of Oklahoma City is JACK STORY. Mr. Story has been engaged in aviation activities for the past eleven years.

• Newly elected president of Pennsylvania Airlines and Transport Company is C. BEDELL MONRO, who succeeds COL. H. S. MARTIN, resigned. Mr. Monro was one of the organizers of Pittsburgh Aviation Industries Corporation, and became vice-president

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DOUGLAS H. DAVIS, transport and racing pilot, was killed when his plane crashed during the Thompson Trophy Race at the National Air Races at Cleveland, Sept. 3. In his Wasp-powered Wedell-Williams racer, he had won the Bendix Trophy and the Shell Speed dash at the meet. His record as a racing pilot had been outstanding since 1929. Affiliated with Eastern Air Lines as pilot since 1930, he was attached to the company's Atlanta-New Orleans division at the time of his death. Davis was born in 1899, had learned to fly with the Army in 1918, and had been active in flying projects ever since.

ALEXANDER CLARKE STEVENS, 30, of American Airlines, died in New York City Aug. 16 after a short illness. Mr. Stevens had been connected with the company's New York office since 1931 when he served as Traffic Representative. Later he became City Traffic Manager and at the time of his death was Assistant City Traffic Manager in charge of passenger solicitation. Before entering commercial aviation in this country, he was employed with the Royal Dutch Airlines at Croydon Field, England.

HENRY E. STICKNEY, maintenance superintendent for Pan American Airways and World War aviator, died at Colon, Panama, Sept. 18. He was 37 years old and was sent to the Isthmus by Pan American a year ago after serving as their representative in Texas. As a member of the Lafayette Escadrille of the French Air Force during the War, he made an excellent record and was brevetted a captain in the aviation branch of the United States Army when the War ended. After his return to the United States in 1919 he became an instructor in flying, and contributed considerably to the development of aviation in this country.

when it started active business in 1929. The next year when P.A.I.C. purchased Pennsylvania Airlines, he acted as executive vice-president, holding the same position through the reorganization of the company early this year after the cancellation of mail contracts.

• L. B. MANNING, executive vice-president of Cord Corporation for the past two years, has been elected president, succeeding E. L. Cord who will remain a director and member of the executive committee. Associated with Mr. Cord in the automobile manufacturing business since 1923, Mr. Manning was influential in putting the Cord group into

L. B. Manning

aviation in 1929 with the purchase of Stinson Aircraft Corporation. Since 1933 he has been president of Aviation Corporation, operators of American Airlines. Assistant to Mr. Manning is W. H. BEAL, recently elected a vice-president of Cord Corporation, who will be in charge of all manufacturing for the Cord interests. R. S. PRUITT, general counsel, was made a vice-president.

• Appointment of ALFRED V. VERVILLE as chief of the Manufacturing Inspection Service has been announced by

Alfred V. Verville

the Bureau of Air Commerce. He succeeds John H. Geisse who was recently placed in charge of the Bureau's new Development Section. Mr. Verville is a noted designer of aircraft. In 1918 he developed a pursuit plane with a welded steel fuselage. The Verville Packard and Verville Sperry racers won the Pulitzer speed trophies in 1920 and 1924. Entering the field of commercial manufacturing in 1925, Mr. Verville designed several well-known planes including the Buhl-Verville Airster, the Verville Aircoach, Sport Trainer, and the Army YPT-10 primary trainer. Recently Mr. Verville served as an airport engineer in Michigan in connection with the airport construction program begun last fall by the Bureau of Air Commerce and the Civil Works Administration.

• At the organization meeting last month, the Independent Air Mail Operators Association elected T. E. BRANIFF, president of Braniff Airways, as president. C. E. WOOLMAN, Delta Airlines, is vice-president, and PAUL SELBY, Rapid Air Lines, vice-president. Though membership includes only mail contractors not affiliated with the Aeronautical Chamber of Commerce, the association will cooperate with the Chamber. It was voted to affiliate with the Independent Aviation Operators Association.

• In training for the MacRobertson Race, AMY JOHNSON MOLLISON has signed up as a regular transport pilot on the cross-Channel service of Hillman's Airways, Ltd. She and her husband, CAPTAIN JAMES A. MOLLISON, plan to fly a De Haviland Comet in the London-to-Australia race.

• MAJ. L. G. BROWER, formerly New York sales manager for General Air Express, has been appointed general manager of the system.

• Changes in the set-up of Arup Manufacturing Corporation were announced in connection with the removal of the company's factory at South Bend, Indiana, to Indianapolis. RALPH R. GRAICHEN, chief engineer, has been named as a director and vice-president in charge of the plant. Other officers and directors are C. L. SNYDER, president, DR. F. J. VURPILLAT, R. A. GOHEEN, H. A. MCCULLOUGH, R. L. STEWART and HIRAM SNYDER. Test pilot for the company is GLENN DOOLITTLE.

• With the incorporation of Menasco Manufacturing Company CHARLES F. MCREYNOLDS becomes vice-president and a member of the board of directors. For the past few months Mr. McReynolds has been in charge of advertising and public relations for the company.

• Following meetings of the boards of directors of the various subsidiary companies of the newly organized United Aircraft Corporation, an announcement of changes in the list of officials of the several manufacturing units was made by DONALD L. BROWN, president of the parent company. LEONARD H. HOBBS and BENJAMIN H. GILPIN be-

L. S. Hobbs

come vice-presidents of the Pratt & Whitney Aircraft Company. Mr. Hobbs has been acting director of the United Aircraft Research Division for several years, while Mr. Gilpin has served as factory manager for Pratt & Whitney since 1930. T. E. TILLINGHAST, former assistant to the president, was chosen sales manager. He will be assisted by

B. H. Gilpin

H. M. HORNER, who remains secretary. ARTHUR W. BROOKSBANK, former auditor, was elected treasurer and will be assisted by M. R. DIMERY.

At Chance Vought, E. B. WILSON, who was recently elected vice-president of United Aircraft Corporation, remains as president. CHARLES J. MCCARTHY will continue as vice-president, and J. J. GAFFNEY has been elected secretary and treasurer. E. K. HUBBARD, former secretary and treasurer, has resigned to take over special duties with the parent company.

SIDNEY A. STEWART becomes vice-president of Hamilton Standard Propeller Company and continues in his capacity as secretary. ARTHUR W. BROOKSBANK will be treasurer. RAYCROFT WALSH continues as president of the company.

BERNARD L. WHELAN, former manager of United Airports of Connecticut and Rentschler Field, has been made president of the organization.

• The Independent Aviation Operators of the United States have announced the appointment of BERNARR MACFADDEN, publisher, as chairman of their

central advisory committee. He will participate in the organization's program for development of private flying.

• PORTER H. ADAMS of Thetford, Vt., has been elected president of Norwich University at Northfield, Vt., one of the oldest engineering and military universities in the country. Having attended the earliest courses in aeronautical engineering given at the Massachusetts Institute of Technology in 1914, Mr. Adams helped organize the National Aeronautic Association in 1922, serving as chairman of the executive committee for four years. In 1926 he was elected president of the association, holding that office until the end of 1928. Among the many other aeronautical posts occupied by Mr. Adams was a trusteeship of the Guggenheim Foundation, and the vice-presidency of the International Congress of Air Navigation of 1927. In 1928 he was technical advisor to the American delegation at the International Civil Aeronautics

Porter H. Adams

Conference at Washington. Mr. Adams has been acting president of the University since last year, and is a member of the Vermont Legislature.

• The Ligue International des Aviateurs recently honored COL. JAMES FITZMAURICE for making the first westward crossing of the Atlantic in the airplane Bremen in 1928. Colonel Fitzmaurice received the King Albert Medallion, founded by the late King of Belgium. Only three other persons have received the award—Colonel Lindbergh, Wiley Post, and Dieudonne Coste.

• DOUGLAS H. WEBBER, chief engineer of Rearwin Airplanes, Inc., has been added to the faculty of Parks Air College as professor of engineering.

• High decorations to 99 Americans were awarded by the Italian Government in recognition of the assistance they gave to General Balbo's flight to Chicago last summer. Among the aviation people who received honors were: VICE-ADM. ERNEST J. KING, MAJ.-GEN. B. D. FOULOIS, DR. JAMES H. KIMBALL, MAJ. E. E. ALDRIN, WILLIAM T. MILLER, CAPT. JOHN D. PRICE, CAPT. W. W. WHITE, CAPT. CARL W. CONNELL, REX MARTIN, CAPT. ARTHUR B. MCDANIEL, CAPT. HAROLD C. MAJOR, CAPT. ROBERT E. ELLIS.

• The lecture program of the Royal Aeronautical Society for the first half of the 1934-5 session includes the name of IGOR I. SIKORSKY, who will speak before the Society in London Nov. 15 on Flying Boats.

Flying Services and Schools

• Increased activity over last year is reported by D. W. Flying Service at the Donald Woodward airport, LeRoy, N. Y., with a registration of fifteen flying and 25 ground school students. In an effort to develop a general interest in aviation and bring more students up to the point of soloing, a special Business Man's Course is offered, consisting of ten hours of dual flying. All flying instruction is under the supervision of Russell Holderman, president of the organization, while the ground school is under the supervision of M. F. Steffen, who is also chief instructor in aviation at the Bogard School at Buffalo.

• Paul Gallico, sports writer for the *Daily News,* who is a qualified pilot and devotes one column a week to discussing aviation, recently chartered a plane and covered three outstanding sports events at widely separated locations on the same day. From New York he flew to Boston to attend the amateur golf matches at Boston, proceeded to Newport to get data on the America's Cup races, and completed the day by covering the famous "Futurity" horse-race at Belmont Park, Long Island. The plane was a Loening amphibion, belonging to George Daufkirk. Swanee Taylor was co-pilot for the expedition.

• E. W. Wiggins Airways, operating bases at Fitchburg, Leominster, Norwood, and Providence, report the sale of a Stinson Reliant cabin plane on floats to the Forestry Division of the State of Maine. One of the earliest instances of the use of the Stinson SR-5A on floats, the ship was fully tested at the Edo Aircraft Corporation base at College Point, Long Island, and qualified before delivery for the Department of Commerce approval.

• The Associated Glider Clubs of New Jersey held their initial meeting Sept. 1-3 at the glider field at Lyons. First place for groups went to Y Flying Club, which won the State Championship Trophy and $50 worth of glider materials. Second honors were awarded to Aero Club Albatross. Newark Tech Glider Club was third. In the individual classifications, Jack Streeter of Y Flying Club scored first with a point total of 1,121. Leslie Barton and Frank Apgar, also members of the Y Club, placed second and third with 752 and 720 points respectively.

STINSON RELIANT APPROVED AS SEAPLANE

After passing Department of Commerce tests this Stinson SR-5A cabin plane on Edo floats was delivered to the Forestry Division of the State of Maine for survey and fire patrol work. As a standard Stinson model it is equipped with speed arrestors and a Smith controllable pitch propeller.

The events included spot landing contests, duration flights and bomb-dropping. Only primaries and secondaries were eligible to compete.

• A new requirement for students in aeronautical engineering at Parks Air College is that they assist in the design and construction of a light airplane. The finished product will be test flown and presented for a Department of Commerce approved type certificate. The new method of instruction was added to give students an opportunity to cope with the same problems that confront aircraft factory engineers. Campus residence accommodations for students at Parks have been expanded 45 per cent. The new quarters will take care of 170 students.

• An interesting innovation in secondary school work has been carried on for the past two years in Teaneck, New Jersey, at the Teaneck High School, first in the country to offer a course in actual flight instruction. Students taking the aviation course spend the first year on ground school work and start flying lessons at the beginning of the second year. Both departments are under the direction of A. G. Norwood. Flight instruction is given at Teterboro airport in a two-place side-by-side Aeronca. This year a total of 85 students, including 24 girls, have enrolled for the course.

• New flight radio equipment for the use of its transport students has been installed at the Ryan School of Aeronautics, San Diego. The sets used not only enable the student to receive voice directions from the ground but also to receive instruction in radio beam flying. This training serves to round out the course given in blind flying with instruments.

• Both New York University and the Massachusetts Institute of Technology have announced that they will repeat their evening extension courses in aeronautics this coming school year. The N. Y. U. courses, under the direction of Ronald H. Spaulding, open Sept. 25; those at M. I. T., under Prof. John R. Markham, on Nov. 19. In each, curricula are designed to cover the ground school needs of student pilots yet still be of general interest. Fees in both cases are nominal.

Side Slips

ALMOST any day now, we are going to announce our candidacy for a Nobel Peace Prize on a platform calling for the prohibition of international sporting events. What's the use of Hands-Across-the-Sea Societies, Lafayette-We-Are-Here Clubs, Boy Scout jamborees, disarmament conferences, and non-aggression treaties, when things like the Olympic Games, the Davis Cup Matches, and international yacht racing can build up more ill will in a week-end than a dozen Senatorial investigations could in a month?

The realistic editor of our esteemed English contemporary, *The Aeroplane*, doesn't think much of the MacRobertson Race as a bond-cementer in any case. All in a perfect good humor, he has been looking forward for months to a grand free-for-all wrangle between "rival gangs," and between the contest officials and certain types of contestants (presumably non-British) who will always prefer to contend on the "win, tie, or wrangle" principle. He reports suggested ambulance services at the takeoff for "any of the foreign entries, who try to be clever and overload their machines" and someone's idea to import a Mr. Al Capone to protect the contest officials against his argumentative fellow countrymen. Finally he has resurrected an ancient scandal of the French aircraft procurement service, in which the ingenious Gauls put inflated rubber bladders in their gas tanks to

reduce their test loads. This might be used by MacRobertson entries to get around the officials, he points out, adding, "This question is complicated by the fact that some of the Americans have made arrangements to fill up with their own brands of fuel . . . at aerodromes which are not official stopping points at all." Which is all too, too bad, just when we Anglo-Saxons were getting to see eye to eye on international questions and were celebrating something or other about our unfortified Canadian border.

Not all the flies in the Buy-British ointment are being scored up to the Yankee entries however. There seems to be a little soreness in the home of roast beef and thin wing biplanes over the disloyalty of several Australian and New Zealand entries turning up with American planes. Colonel Fitzmaurice's Bellanca Swoop doesn't seem to bother them half as much. But he was bothered, and plenty, over being carried in the entry list as British rather than

Irish. As though there could be any mistake on that score.

Seriously, however, we do hope our own most ambitious entries won't live up to their advance notices and try to fly the whole route on Great Circle courses. There are several places where the Great Circles cut over places like Afghanistan and the hinterlands of Asia Minor, which aside from mountains, deserts, and the general perils of the wilderness, are infested with natives. These natives we understand enjoy nothing better than taking apart an aviator to see what makes him tick, much as you or I might like to disassemble a Sperry Robot. This is a hazard we aren't used to much in this country. In fact, outside of an occasional pot shot taken for the fun of it at a passing blimp or airplane by our casual hunting gentry, our natives are definitely of the friendly sort.

But to revert to our British cousins, there seems, alas, to be more to divide us than a few thousand miles of ocean and a difference of opinion on steel-tube welding. There is for example this question of humor. We feel sure there wouldn't be half the trouble there is over debts, and luffing, and even wing loading could we only laugh at each other's jokes. However, if our own sallies are as incomprehensible to the British as the following item is to us, we must be further in spirit from our colinguists than we are from the Hottentots. We culled it from the September issue of *The Aeropilot* (monthly at sixpence).

"The Navy is understood to be seriously annoyed by our esteemed contemporary for publishing a photo of a large gent alongside a small aeroplane and describing the gent as "The man who made the dreadnaught rotary in 1910."

"Admiral Hellet-Loose informs me with many a seafaring oath that it was he who made the dreadnaught rotate in 1909. One stormy night when the helm swung him off his feet for three complete revolutions—

"Codroes (coldly): This has nothing to do with flying.

"Myself (warmly): No, but it accounts for the great chip out of Plymouth Hoe which has so greatly puzzled all the most eminent antiquarians."

For the best explanation of this quip in an essay of not over 200 words, or the best blue print which will lead us from point to point through it, we offer one slightly dog-eared copy of "The Arkansas Traveller Joke Book for All Occasions."

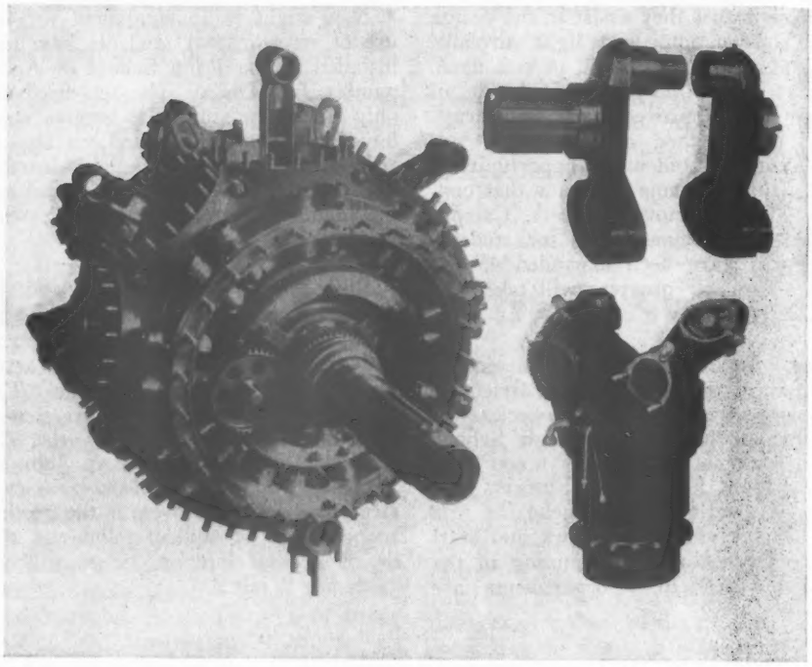
FLYING EQUIPMENT

Latest Wasp

SUPERFICIALLY all nine-cylinder radial air-cooled engines look pretty much alike, and by the same token the new series H Wasps have much in common with the preceding D series. After taking one of them apart, however, either on paper or in the shop, it becomes apparent that the H engine is a marked advance over its predecessors. Not only have many routine design improvements been made (such as heavier crank case forgings, heavier main roller bearings, more hold-down bolts per cylinder, etc.), but a number of entirely new features have been added. Airlines are continually looking for power plants which can be run with a minimum of attention between overhauls, and the new Wasps have been designed with their requirements kept to the fore.

One bothersome item for operators has been the continual necessity for hand lubricating rocker boxes, and making clearance adjustments every 20 to 40 hours. Pratt & Whitney engineers have devised a continuous pressure lubricating system tied in with the engine oiling system which has made it unnecessary to touch rocker box assemblies except at very long intervals. Two engines on scheduled service have been running on 100-hour intervals, and the results have been so encouraging that routine rocker box adjustment has been put on a 150-hour basis. Pressure oil is bled from the crankcase and introduced into the boxes through the push-rod assembly. After passing through the bearings, the oil collects in a small sump in each box. For the cylinders above the horizontal, the oil is returned to the crankcase through the push-rod housings. Cylinders below the horizontal are interconnected by an external manifold through which surplus oil is returned directly to the tank by an extra stage in the oil pump assembly. All piping and connections of the manifold lie within the outside diameter limits of the engine, or entirely inside ring or NACA cowling. Since it is unnecessary to remove the rocker box covers at frequent intervals, the old bail device has been eliminated and the covers are held on by three studs fitted with Elastic Stop Nuts.

Further improvement in the lubrication system is effected with an automatic temperature control valve, which, by means of a thermostat, bypasses oil below 155 deg. F. around the cooler to the bottom of the tank and passes oil at temperatures above 170 deg. F. through the cooler and into the top of the tank. Oil can thus be automatically maintained at the most efficient operating temperatures under a wide range of weather conditions.



A Few Details. The new cam assembly is shelf-mounted, and the driving gears are provided with outboard bearings. The crankshaft is divided in the center of the main bearing and the telescopic section is provided with 31 instead of 16 splines as in former models. Cylinder heads have been re-designed for better cooling. Stainless steel inserts in exhaust ports offer flexible slip connections for exhaust manifolds. Note the P & W thermocouple washer under rear spark plug.

Particular attention has also been paid to maintaining the oil-tight integrity of the engine. Extra thick flanges are provided on all pipe and accessory covers, and cover plates have been stiffened up to prevent warpage and leaking. Rubber inserts have been provided on cylinder flanges and between sections of the crankcase. Push-rod covers have been made oil-tight by making them in one piece and providing an oil-tight packing gland at each end. Improved methods have also been developed to transfer pressure oil from crankcase passages into crankshaft and propeller.

The usual steel barrel-aluminum head cylinder has been retained, but a number of improvements are in evidence. Fins have been made deeper, thinner, closer in pitch, to improve head cooling. Some modifications in form have been made around the exhaust valve. The exhaust ports have been provided with pressed-in stainless steel liners instead of the older type flange and bolt connections. Manifolds thus fit into the ports with plenty of opportunity to come and go with changing temperatures without imposing strains on the cylinder head. Sufficient clearance has been provided around the rear spark plug opening to accommodate a Pratt & Whitney thermocouple washer. This gives a permanent and convenient connection for head temperature indicators.

The baffling for the new engine is of the full pressure type, but differs from older models in that it is sectionalized so that any cylinder may be removed from the engine without disturbing any but the immediately adjacent baffle sections. The head baffle is permanently attached to the cylinder and comes off with it. The between-cylinder baffles are easily taken down by unbolting a single butterfly clip.

A number of mechanical changes have been incorporated, all of which lead to simplification and ruggedness. The cam, for example, is mounted on a generous bronze bearing which is backed up by a shelf, or large diameter annular ring. The latter is an integral part of the front half of the crankcase. An inner cover plate over the cam section provides an outboard bearing for the cam driving gear, thus preserving accurate alignment. Valve tappets are mounted in a flange on the front main case, directly over the cam track. Both the tappet support ring and the cam

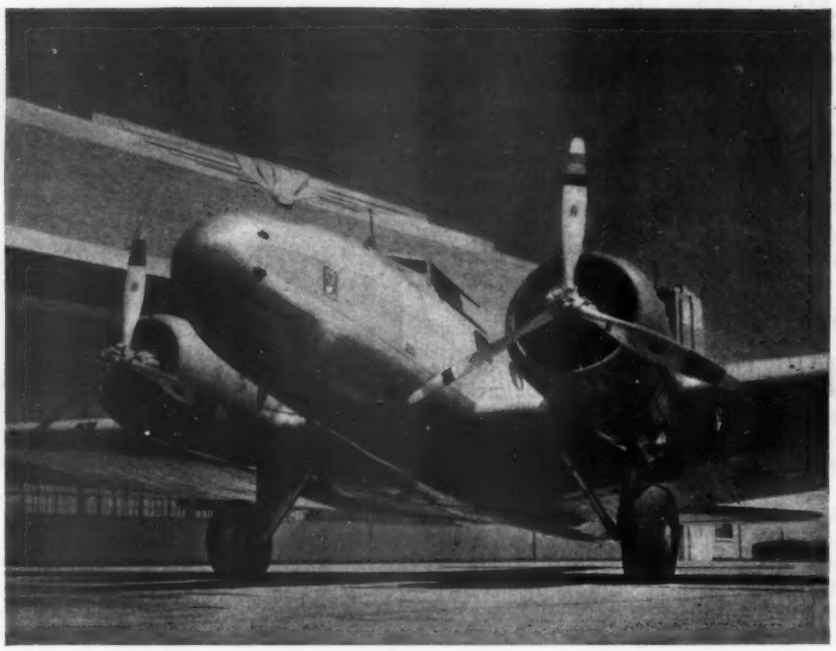
shelf ring add considerable stiffness to the crankcase.

The split type crankshaft has been retained, but where in the older production models the main journal is in one piece and the parting line at the rear crank face, the new Wasp crankshaft is split in the center of the main crank pin bearing, one-half of the bearing being integral with the rear crank throw, and one-half with the front throw. This has been done to add strength and stiffness to the point of attachment between the pin and rear crank arm, adding torsional rigidity to the assembly. The clamping bolt has been enlarged over previous models and where formerly 16 splines were used in the telescoping sections, 31 appear in the new crankshaft, a change which gives additional strength at a point of heavy torsional stress.

Forged aluminum pistons with rib-reinforced heads are standard equipment, but one additional ring has been fitted making five rings per piston. Connecting rods are of the usual banjo type, but they have been strengthened up considerably to handle higher stresses.

The reduction gear train is distinctly new. Formerly the propeller shaft carried the large bell-like annular gear, this arrangement has been reversed in the new engine, the bell gear being attached to the crankshaft proper, and the spider carrying the intermediate gears is keyed to the propeller shaft. The sun gear is bolted directly to the front gear cover. This arrangement offers a simplified train and also permits a considerably longer bearing for the propeller shaft. The design is such that all gear teeth can be accurately ground, a feature which has made it possible to eliminate equalizer devices in the gear train.

The supercharger drive has been revamped. Rigidity and balance are attained throughout by the use of outboard bearings of the ball precision type. The slip clutch has been redesigned to give more uniform distribution of stress in the springs and thus reduces liability of breakage.



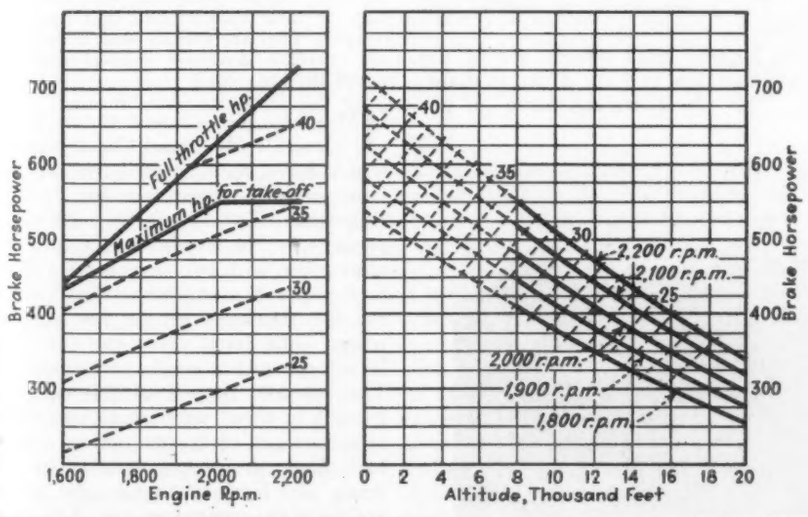
The substitution of the latest geared Series H Wasp engines swinging three-bladed controllable propellers for the older direct drive Wasp and two-bladed combination adds power, performance to United Air Lines' transports. With ten of the new machines going into service this fall and with older models changed over to the geared types, substantial reductions in coast-to-coast schedules are expected.

Other new features of the engine include a redesigned "hot spot," an elliptical steel tube cast in an aluminum housing. The aluminum casting has been flattened considerably as compared with older models, thus making the carburetor installation much more compact and facilitating the installation of either top or bottom air intake. The carburetor is of the self-priming type (priming being accomplished through the accelerating pump by wobbling the throttle from the cockpit before starting, the mixture control having first been put in the full lean position). Another feature is the removal of the controllable pitch propeller control from its old location on the nosepiece to the rear face of the oil sump casting. The new location simplifies installation of control connections in the airplane.

The new series H is being rated for commercial use somewhat below the ratings which are expected to be permitted for military service, a factor which should contribute toward reliability, and towards reduction in parts replacement during the normal life of the engine. Five models of this engine are to be offered, the first, the S1H1-G is now available commercially for domestic and export delivery. The characteristics of the five engines are as follows:

Engine	hp.	r.p.m.	Altitude	Gasoline	Compression Ratio	Blower Ratio
S1H1-G...	550	2,200	8,000	87	6	12
S2H1-G...	500	2,200	10,500	80	6	12
S3H1-G...	550	2,200	5,000	80	6	10
S3H1.....	550	2,200	5,000	80	6	10
T1H1.....	525	2,100	S. L.	80	6	10

Detailed specifications of the S1H1-G include: Approved type certificate—No. 129; Manufacturer's rating—550 hp. at 2,200 r.p.m. at 8,000 ft.; Available at sea level, level flight (controllable pitch propeller), 550 hp. at 2,200 r.p.m.; Available at sea level, level flight (fixed pitch propeller), see power curve; Bore, 5.75 in.; Stroke, 5.75 in.; Displacement,



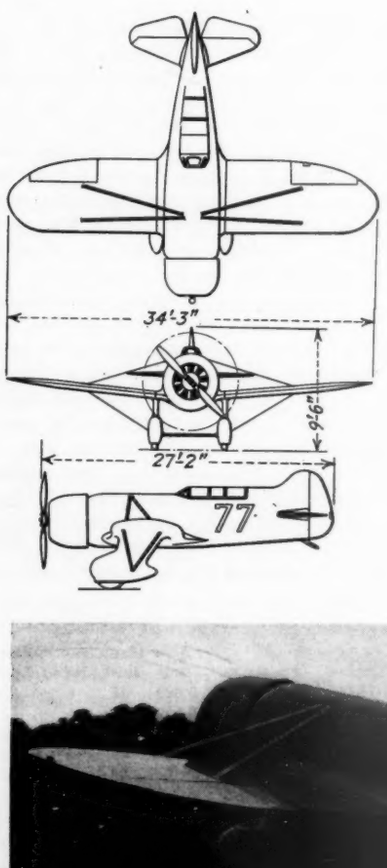
Power Curves for S1H1-G Wasp. Solid lines are horsepower curves, broken lines indicate manifold pressure in inches of mercury (absolute).

1,344 cu.in.; Propeller gear ratio, 3.2; Overall diameter, 51 7/16 in.; Overall length, 48 3/4 in.; Bare engine weight, 875 lb.; Weight including standard equipment, 918 lb.; Fuel consumption, 0.48 lb. per hp.-hour at full throttle at rated speed (for best power); Oil consumption, 0.035 lb. per hp. at rated speed; Propeller shaft, S.A.E. No. 40 spline, for special hub having 15-deg. taper for rear cone.

Sport Racer

THE Q.E.D., recent product of the Granville, Miller, and DeLackner factory at Springfield, Mass., represents a big step toward applying the principles of racing design to the manufacture of a two-place, long-range cabin sport plane with definite if limited market possibilities. Capable of first-rate performance in such events as the Bendix or MacRobertson Trophy races, it has been designed to meet the Bureau of Air Commerce requirements for "C" classification, and through the use of wing flaps, has retained a practical landing speed.

Following the Gee Bee 11 in having a fuselage of large diameter, the Q.E.D. is much longer and has more than twice the wing area and control surfaces as its prototype. Its flaps extend from the inner end of the ailerons to the roots of the wings, and are of the type patented by the late Z. D. Granville. It is powered with the P & W Hornet but has been designed for any large radial engine up to 1,000 hp.



The fuselage is of welded chrome molybdenum tubing throughout with detachable engine mount. The main fuel tank has a capacity of 275 gal. and is provided with a dump valve. Directly behind the fire wall are a 25 gal. reserve tank, and another supply tank of 100 gal.

The wing structure consists of a double front spar and a single rear one connected by heat treated compression tubes carefully designed to eliminate eccentricity. There are no drag wires, the shear loads being carried by the plywood skin.

The tail surfaces are all plywood covered, and of full cantilever design. The rudder is provided with an adjustable tab, and continues the lines of the fuselage fairing, being nearly a foot thick at the widest point at the hinge line. The stabilizer is, of course, adjustable.

The landing gear wheels are of the streamlined type and are 31 in. in diameter. The wheel fairing boots do not move with the wheels but are rigidly attached to the stationary landing gear structure.

Over the cockpits is fitted a coupe top of shatter-proof glass with sliding side windows. In each cockpit are full controls and engine instruments, a second set of navigation instrument equipment being optional.

The N.A.C.A. cowling is designed to be removed in two halves. The inner cowl is provided with convenient inspection doors. All fresh air intakes are brought in through the engine baffle which is of the pressure type. Two intakes provide ventilation for the cockpits; two more feed the carburetor; a fifth is connected with an oil cooler. Exhaust air from the inner cowl is drawn off by a venturi tube in the bottom of the fairing just behind the fire wall.

Q.E.D. by Granville, Miller, and DeLackner.

British MacRobertson contender—the D.H. Comet.

British Threat

[Most potentially formidable of the British entries in the MacRobertson Trophy race, the D.H. Comets have been the subject of much discussion on both sides of the Atlantic. We publish here the first definite details of their construction that have been released. They are sent by Maj. Oliver Stewart, regular AVIATION correspondent for Great Britain.—Ed.]

TEST FLIGHTS with the first of the three De Havilland Comet airplanes which have been entered for the England-Australia speed race for the MacRobertson Trophy on Oct. 20 are in progress. The machine is a low wing monoplane with two inverted De Havilland Gipsy Six engines. Wood is used for the structure of the fuselage and wing. The latter is of the full cantilever type with a single very wide spar. The top and bottom of this spar are formed of three substantial laminations of spruce laid in the manner of a carvel built boat, the strips crossing one another. The laminations take the stresses and form the outer covering of the wing.

The wing is tapered and resembles in

proportions the wings used by the De Havilland Company in their D.H.86 and 89 airplanes. The fuselage is monocoque and carries the two pilots in tandem, their enclosed cockpit being well aft of the trailing edge of the wing. Three gasoline tanks are carried in the fuselage, two forward of the pilots' cockpit and one aft. They have their filler caps at the top of the fuselage and are supplied with quick opening caps of large orifice.

The undercarriage is retractable, the wheels going up on a worm retracting gear behind the engines and carrying with them a fairing plate. When the wheels have been withdrawn the engine nacelle appears perfectly flush. Landing lights, one on each side, may be incorporated in the retractable undercarriage so that when the wheels are lowered the lights come into position for use.

The engines are of the Gipsy Six type but they have been modified in respect of their frontal area. The cylinder heads have been re-designed and the valve gear and oil reservoir at the bottom of the engine (which is of the inverted air-cooled type) have been changed so that a reduction in overall height of 2 in. has been secured. A good deal of work has been done to secure the lowest possible fuel consumption figures and it is now hoped that the machine will be able to fly any of the stages in the race non-stop so that it will use only the five obligatory stopping places or "controls."

Special arrangements have been made by the crews of the three Comets in the race so that each machine will be attended to at the controls individually. There should therefore be little time lost in re-fueling. At some of the stopping places high speed re-fueling pumps will be used similar to those used in the big motor car road races. Nothing definite is known as to the speed capabilities of the new machines. A maximum speed of 240 m.p.h. is thought to be within reach. It is probable that tests will be performed before the start of the race which will give a good indication of the Comet's speed. The machine is designed to have the take off required by the I.C.A.N. regulations for airworthiness. It has no slots or wing flaps but it is provided with air brakes in the form of two panels near the wing roots on either side of the fuselage. These can be brought down to increase drag and spoil the glide.

No decision has yet been reached as to the airscrews to be employed. Controllable pitch propellers must be used and the design assumes them, but they may be Hamilton or Ratier. Both types are being tried by the De Havilland company at their Hatfield aerodrome. As it was not possible to produce a special Hamilton design to suit the six-cylinder in-line engine, a propeller designed for a radial engine of equivalent power is being tried. The Ratier propeller, which gives two positions but which, when once the pitch has been changed, cannot be brought back again while in the air, has also been tried and has given satisfactory results.

The wing loading of the Comet has not been divulged but it appears that it must be in the region of 29 lb. per sq.ft. Three machines of the type are being built, one to be flown by Mr. and Mrs. Mollison, one by Bernard Rubin and Ken. Waller, and one by C. W. A. Scott and Campbell Black. Bernard Rubin is ill at present and it is possible that he will not be able to fly himself.

The Comet has some points of resemblance to the Italian Bergamaschi P.L.-3 which is to be flown by the Italian pilot Lombardi with V. Suster as second pilot. This machine is also loaded to about 29 lb. per sq.ft. It is a low-wing monoplane with retractable undercarriage; but side-by-side seating is provided for the pilots instead of tandem seating. A Pratt & Whitney Hornet is to be used in the Italian machine.

NEW VOLUMES FOR THE SHELVES

AERODYNAMIC THEORY, VOL. I; *William Frederick Durand, Editor in Chief; Julius Springer; Berlin 1934, 398 pages; $9.50 approximately.*

DURING the active life of the Guggenheim Fund for the Promotion of Aeronautics, provision was made for the preparation of a series of monographs on the general subject of aerodynamic theory. This is the first of six volumes to appear. Edited by Dr. Durand they will form an almost indispensible basic working library for advanced students of the aerodynamic field. This volume contains papers on "Mathematical Aids" and "Fluid Mechanics, Part I" by Dr. Durand, "Fluid Mechanics, Part II" by Max M. Munk, and a historical sketch of the field by R. Giacomelli and E. Pistolesi.

HANDBOOK OF AERONAUTICS; *Technical Editor, J. Laurence Pritchard, General Editor, C. G. Burge; Sir Isaac Pitman & Sons, Ltd.; London 1934, two volumes, 700 and 400 pages; $7.50 and $4.50.*

THE revised and enlarged edition of a handbook appearing in one volume in 1931, these two volumes, while of primary interest to British designers, contain a great amount of well organized material of international value. It differs from American handbooks in being a compendium of monographs by specialists rather than an over-all treatment of the field by one or two authors. In addition to the subjects of aerodynamics, performance estimation, structures and materials, it contains sections dealing with meteorology, radio, aerial photography, and engines. In fact the second volume is entirely devoted to the last named subject, being written by Andrew Swan, well-known authority on British engine design practice.

EXPLORING THE UPPER ATMOSPHERE, *by Dorothy Fisk; The Oxford University Press, New York, 1934; $1.75.*

A GENERAL résumé of the research progress that has been made on the problems of our upper atmosphere. Written in the English conception of the popular scientific manner, it is still of real value to technical students not specialists in the field. The behavior of sound waves, radio waves, ultra violet light, and cosmic rays in the stratosphere are dealt with.

JUNKERS UND DIE WELTLUFTFAHRT, *by Fischer V. Poturzyn; Illustrated by August Dresel; Publisher, Richard Pflaum, Munich.*

ALTHOUGH this volume was obviously published as a general catalog of Junkers equipment, it is really a great deal more than just that. It is probably one of the most comprehensive reviews of certain phases of aeronautical progress in Germany that has ever been turned out. It goes back to the early days of flying (1909), covers the War years, and brings current history down to the giant G-38, and the latest developments in high powered light diesel engines. The illustrations cover not only many details which are specifically Junkers, but include a number of maps, charts, and comparative tables of general interest to students of world aviation problems. Certain non-aeronautical activities of the company (in the marine and power plant field) are also covered.

THE BUYERS' LOG BOOK

AVIATION'S *Card Index of New Equipment*

This department is equipped to help readers locate manufacturers of any parts, accessories or materials

AIRPLANE ACCESSORIES — **Landing wheel**

Air Transport Equipment, Inc.,
Building 20-A, Roosevelt Field, Garden City, N. Y.

A NEW-TYPE airplane landing wheel to mount standard 9.50-12 semi-low pressure tires has been announced. The wheel fits Bendix brake mechanism and a $2\frac{3}{16}$-in. axle without changes or adaptors. Fitted with a new type graphited oil-less bearings. It is stressed to carry planes of gross weight up to 6,000 lb. D. of C. approved.

AVIATION, *October, 1934*

ENGINE ACCESSORIES — **Pumps (catalog)**

Romec Pump Company,
Elyria, Ohio

THE complete line of Romec engine accessories is covered in a new loose-leaf catalog. Contains not only complete description, specification and mounting instructions for all fuel pumps, emergency pumps, relief valves, vacuum instrument pumps and all necessary accessories, but also presents full data on pump testing procedure, testing equipment, blank performance data charts, etc.

AVIATION, *October, 1934*

MATERIALS — **Cleaning compound**

Magnus Chemical Company,
Garwood, N. J.

A NEW cleaner for quickly removing heavy coatings of grease, caked oil and dirt, etc., from machine parts is announced under the name Magnusol. No brushing, scraping or scrubbing is usually required after immersion in the compound. Dirt loosened is removed by cold water hosing or rinse. May be used cold, but best results obtained when warmed to about 140 deg. F.

AVIATION, *October, 1934*

MATERIALS — **Fabric rejuvenator**

The Glidden Company,
Cleveland, Ohio

A NEW product, Glidair Fabricote, provides a convenient means of restoring checked or cracked fabric finishes without damage to fabric. Applied by spray, three or four coats softens old finish, causes cracks to amalgamate, tightens fabric, and provides good foundation for application of final re-finishing coats of plain or pigmented dopes of all kinds. Literature available.

AVIATION, *October, 1934*

RADIO — **Radio compass**

Westport Manufacturing Company,
Glendale, Cal.

RADIO compass to lay a course on any broadcasting station consists of indicating dial in cockpit, a standard Westport receiver and compass converter unit (mounted anywhere in ship), a dynamotor and loop antenna in fuselage. Complete assembly, including cables, weighs under 45 lb. Receiver and converter, $12x7\frac{3}{4}x11\frac{1}{2}$ in. overall.

AVIATION, *October, 1934*

SHOP EQUIPMENT — **Drill attachment**

Dzus Fastener Company,
P. O. Box 598, Babylon, L. I., N. Y.

THIS tool, used in connection with any standard portable electric drill, permits drilling holes as close as $\frac{1}{2}$-in. to a wall and parallel to it. It will also reach into obstructed points through a $\frac{1}{2}$-in. hole. There are no knurled areas to damage adjacent surfaces. Safe to operate, and is suitable for drills up to $\frac{1}{4}$-in. capacity. Specifications available on request.

AVIATION, *October, 1934*

SHOP EQUIPMENT — **Air control valves**

A. Schrader's Son, Inc.
Brooklyn, N. Y.

TWO new valves have been developed for the control of compressed air lines in the shop. The No. 7796 blow valve is button-operated, pipe mounted, and may be conveniently attached to bench tops or bench legs for hand or foot operation. The No. 7854 is flanged and drilled for permanent attachment to machine frames. Available both for direct action on plunger, or lever operated.

AVIATION, *October, 1934*

SHOP EQUIPMENT — **Sanding machine**

Sterling Products Company,
314 Curtis Building, Detroit, Mich.

THE Sterling Speed-Bloc sander is a portable hand tool for all types of small shop and production line sanding jobs. Sanding pad has oscillating motion with $\frac{1}{4}$ in. stroke at 2,500-3,000 cycles per minute. Pad is flexible—rubber and felt backed—to follow irregular or curved surfaces. Weighs 7 lb. complete and operates from 70 lb. per sq.in. compressed air.

AVIATION, *October, 1934*